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A Glance at the Contents—

New Type of Station Meter.

A descripion of the Brandl-Marischka wet meter was given in "Das Gas- und Wasserfach" for Aug. 2, and an abstract translation of the article appears in our columns to-day.

Collecting Gas Statistics in U.S.A.

In a paper before the recent World Power Conference in Berlin, Mr. P. Ryan tells of the work of the American Gas Association in collecting statistics relating to the gas industry in the United States.

New Books Reviewed.

Three new German publications are reviewed in our columns to-day. They deal with long-distance gas transmission, the solidifying-point and viscosity of bituminous compounds, and equipment for the testing of refractory materials.

Annual Congress of the French Gas Industry.

Further abstracts are given of a number of papers presented at the Fifty-Third Congress of the French Gas Industry, held recently in Paris under the Chairmanship of M. Robert Ellissen, President of the Syndicated Union of the French Gas Industry.

The American Gas Industry To-Day.

An abstract of a paper on this subject, submitted at the World Power Conference in Berlin last June, will be found on later pages. Particular emphasis is laid upon the importance of advertising in America and of schooling the sales personnel in order to increase more rapidly the industrial business.

Head of Department for Technical Institute.

The London County Council invite applications for a Head of the Gas Engineering and Supply Department at the Westminster Technical Institute, Vincent Square, S.W. 1. The salary offered is £580 at the commencement, rising to £725.

Mr. Brearley on the Gas Fire Campaign.

In our Correspondence columns to-day Mr. J. H. Brearley gives some valuable suggestions for increasing the gas fire load. He enlarges upon some of the points raised in previous correspondence on this subject, and summarizes the main lines to be followed in promoting an intensive gas fire campaign forthwith.

How Gas Engineers are Trained in Michigan.

The necessity for efficiently trained young men to study the problems of the gas industry, and to design and operate gas-making apparatus, required the development of a new mode of training in America; and Mr. E. S. Pettyjohn, Assistant Professor of Gas Engineering in the Department of Chemical Engineering, Michigan University, explains the Course in Gas Engineering at the University.

Co-Partnership at Aldershot.

The Annual Meeting of the Co-Partnership Scheme and Hospital Benevolent Fund of the Aldershot Gas, Water, and District Lighting Company was held to-day, Mr. R. W. Edwards, J.P., Managing Director of the Company, presiding. In the course of an address to the co-partners the Chairman referred to the satisfactory position of the Company, saying that they had already added some 700 to the total number of consumers during the present year.

A Big Coke-Handling Plant.

A few details are given of what is reputed to be the most extensive system of coke-handling machinery every designed for this or any other country. It is in connection with the installation of coke ovens now under construction at the Beckton Works of the Gas Light and Coke Company; and the contract for the handling plant has been entrusted to Messrs. West's Gas Improvement Company, Ltd. (Manchester).

"Technical Data on Fuel."

The Second Edition of this valuable work is reviewed in our columns to-day by T. Campbell Finlayson. This edition, which is edited by H. M. Spiers, under the auspices of the Technical Data on Fuel Sub-Committee of the World Power Conference, has been revised and considerably enlarged, additions having been made in every section. The volume takes the same general form as the first edition, but contains approximately one-third more matter.

Producer Gas Practice.

In a paper before the World Power Conference in Berlin last June, N. E. Rambush and F. S. Townend discussed the question of producer gas practice from the point of view of the carbonizing industries. The authors hold out hope for the future of mechanical producers in the gas industry. Their adoption or non-adoption will be influenced largely by the experience of the mechanical installations at present in operation at Partington, Wandsworth, and Chapel Whaley.

The Finance Act of Nineteen-Thirty.

On later pages is a specially-contributed résumé of the provisions of the Finance Act of 1930 as they affect our readers. Various items, such as the effect of the recent increase in income-tax, the assessment of businesses, clauses dealing with superannuation funds, quinquennial revaluations, amalgamations, and so on, are dealt with in detail. In conclusion, there is a summary of certain new clauses which were not accepted, but which, in our contributor's opinion, will doubtless be brought forward again.

The Croydon-East Surrey Amalgamation.

The report is concluded this week of the Board of Trade Inquiry into the application by the Croydon Gas Company for an Order under Section 10 of the Gas Undertakings Acts, 1920 and 1929. The object of the Order is to authorize the Croydon Gas Company to acquire the East Surrey Gas Company and the Oxted and Limpsfield Gas Company, and to change the name of the Croydon Company to the Croydon and East Surrey Gas Company. The question of differential prices is discussed at some length.

Sale of Coke to Specification.

The subject of the purchase and sale of coke to specification is dealt with by E. C. Evans. It is evident, he says, that there are a number of technical problems yet to be overcome before a fair basis of valuation of coke, taking into consideration physical and chemical properties, can be evolved. The co-operation, however, that has been effected through the various Coke Research Committees in Great Britain between coke makers and users is already leading to results which are of service not only in attempting to evaluate coke on the basis of its properties, but in securing a greater uniformity in the character of the coke made in the different districts, and thus reducing the variables which have to be allowed for.

EDITORIAL NOTES

Finance Act, 1930

NOTWITHSTANDING a motion by the Opposition for the rejection of the present Government's first Finance Bill on the Third Reading in the House of Commons, the Bill was carried by the narrow majority of 38 votes and passed through all its stages in the House of Lords on July 29, receiving the Royal Assent on Aug. 1. In distinct contrast to the six-clause Finance Act of 1929, the present Bill, when introduced by the Chancellor of the Exchequer, contained no fewer than 47 clauses and 3 schedules; but it must be said that it did not display any of the changes of a revolutionary character predicted in some quarters as the outcome of the change of Government, although the increasing cost of the Social Services has resulted in an increase in income-tax, which will most certainly tend to hinder trade.

Perhaps the most important as affecting gas undertakings is the extension of Section 55 of the Finance Act, 1927 (Stamp Duties). A résumé of the provisions of the Act which are of more than passing interest has been specially contributed to our columns to-day. It directs attention to certain sections affecting our readers, and comments on certain proposals which have not as yet been accorded legislative approval.

A Desirable Load

IN comparison with many other branches of industry, the gas salesman is at great advantage in having many "strings to his bow." There are regular loads, and there are seasonal or intermittent loads which fit in more or less conveniently one with another. This dovetailing is not exact, of course, and the enterprising salesman will be always on the look-out for fresh business during the off periods. While the refrigerator is not entirely an off-period load, it does take gas during the quiet hours, as well as at other times. It is, in fact, a "round the clock" consumer, and therefore much to be desired.

The consumption per appliance is not, perhaps, a very great one, but the aggregate of a number of installations is a useful addition to an undertaking's output. There are, too, other considerations. Already the value from a hygienic point of view of an efficient refrigerator is understood by many people. The knowledge is spreading, and in the not far distant future its adoption will be general. Then, no doubt, as with other modern methods, people will wonder how they managed ever to do without refrigerators. Now is the time to look ahead—to ask ourselves: "Shall it be a gas or an electric refrigerator?" With the overwhelming proportion of houses in the country already supplied with gas, the answer in the majority of cases should be easy. Yet one learns with astonishment that, though there should be many more gas than electric refrigerators in use, at present this is not actually the case. The opportunity is here. Left to the electrical undertaking, it may afford a foothold in a home; seized by the gas industry, it may, in addition to its regular load, in some cases even turn an unprofitable consumer into a remunerative one. Which is it to be?

And a Good Example

THESE reflections arise out of a happy function which took place at the Trocadero Restaurant a few days ago, when interested members of the staff of the East Surrey Gas Company dined together under the Chairmanship of Mr. W. H. Bennett, the Managing Director. The occasion was taken advantage of by Mr. J. Scrivener (the Managing-Director of Electrolux, Ltd.), who was one of the guests, to distribute awards made by his firm in connection with competitions for authorized distributors. That a comparatively small undertaking like the East Surrey Gas Company should have been able to effect more sales during the month of July than any other distributors of Electrolux refrigerators is remarkable. It is a tribute to the excellence of the Company's selling organization, and also to the gas refrigerator, which we should like to see as eagerly taken up by other gas undertakings throughout the country, so that the fullest advantage may be taken of the immense possibilities that it opens to the gas industry.

The East Surrey Gas Company have set an admirable example; let others follow. Mr. Bennett modestly disclaimed any great share in the campaign which his staff have so triumphantly carried through. We know, however, that such successes as this can be achieved only by the closest co-operation; and co-operation, if it be effective, includes the head as well as all other members of the organization. We would urge the industry in general to take as its slogan "The heat that freezes," and to set to work with a will to popularize the gas refrigerator. We have it on the authority of Mr. Arthur Tennant, Sales Manager to the East Surrey Gas Company, that the service given to consumers by this appliance is of the highest order.

Education for Gas

THERE are two types of education which our industry cannot do without. One is education of the public—which, of course, includes the doctor and the architect, the editor and the builder—and the other is education of those who are in the industry itself. In both directions our organizations in this country are in full swing, and are every day producing admirable results. In many ways these organizations may be regarded as pioneers, just as Great Britain was the pioneer of the gas industry; but we are to-day hearing so much about the education of those engaged, or who hope to be engaged, in the gas industry of this country that a few moments spent in considering the methods of our friends in the United States cannot but be well spent. For this reason we direct the attention of our readers to the singularly interesting course of instruction at the University of Michigan, an account of which will be found on later pages of this issue of the "JOURNAL."

The course at Michigan extends over five years, and it provides an excellent example of co-operation between industry and a university—a modification of that form of co-operation which has proved so eminently successful in this country; we refer to the liaison between the gas industry and the University of Leeds. But there is one thing about the Michigan course which appeals to us very strongly indeed; the training is a combination of theory and practice, both being conducted in the proper spirit. All too frequently in England, students who work at gas-works during their vacations not only get no pay, but also obtain little guidance to ensure for them varied employment which will put them in direct contact with the different aspects of gas manufacture, distribution, and utilization. We believe firmly that the system of paying a young fellow for his work will have to come in this country, for it is a method which is of direct disciplinary benefit to the student, and lends the impression that the industry does think something of those who are willing to spend five years in order to fit themselves for their jobs. In America, the students' pay is workmen's pay. So it should be; neither more nor less. A student is a workman—often an uncommonly good one. Let him therefore be treated like a workman in a gas-works, and not like a pariah, during his vacation courses. Fourteen months' direct employment is the rule at Michigan, in addition to a preliminary trial of two months; the rest of the five years is taken up in theory, and, we hope, an occasional holiday for the student.

We will not dwell in any detail on the Michigan programme, which is so well set out on later pages by Mr.

E. S. Pettyjohn, Assistant Professor of Gas Engineering in the Department of Chemical Engineering at the University. We would remark, however, that Michigan is one only of several centres of higher gas education in America. It is a noteworthy fact, said Mr. E. B. Luce at the World Power Conference in Berlin last June, that the most successful gas companies in America are those that make the proper education of employees one of their important activities. There is growing appreciation of education in the States, which accounts for the fact that there are so many correspondence courses organized jointly by the American Gas Association and the Universities, of which the course given by the Columbia University, referred to later, is an excellent example. Then the Johns Hopkins University of Baltimore offers a complete gas engineering course, beginning with a fully co-ordinated and distinct undergraduate course which is extended in a separately organized department into the graduate and research fields of study. And at the University of Illinois there is a four-year course in gas engineering—the first two years, practically the same as for students in chemical engineering; the last two years, directly related to the gas industry. We could quote further examples, such as the University of Pennsylvania and the Massachusetts Institute of Technology, to show what the Americans think of gas education. It is fortunate that we could also quote comparable examples, relating to Great Britain, to demonstrate that, while there is distinct room for improvement, our industry here is by no means unaware of the virtues of an adequately trained personnel.

Producer Gas

THE authors of a paper on this subject before the World Power Conference in Berlin—Mr. N. E. Rambush and Mr. F. S. Townend—state that the development of a method of gasifying coke breeze where the capital cost of the producers *plus* the cost of producer gas recuperators can be brought nearer to the cost of the static brick-built producers would provide a powerful impetus for our industry to reconsider present practice. Should such a development take place, there would be a large field for the application of mechanical producers in the gas industry. An abstract of their paper is published in the "JOURNAL" to-day, and will doubtless prove of value. Some of the matter is not new, but it has rightly been included in order to present a proportioned view of present producer gas practice in the carbonizing industries. At present there are, we believe, only four gas-works in which mechanical producers are installed, in spite of the advantages of having a supply of clean heating gas subject to very close regulation, and the elimination of the heavy manual attention to the static producers. The trouble has been the high capital cost of external producers *plus* recuperators, and the difficulty of reduced output when gasifying breeze. However, there are now in operation examples of mechanical producers in connection with horizontals, intermittent verticals, and continuous verticals; and before long an installation of mechanical producers will be put to work to heat a battery of coke ovens. The last-named plant is, of course, under construction at Beckton; and it will gasify breeze. The future extension of mechanical producer plants will doubtless be largely determined by the experiences at these four works—Manchester, Wandsworth, Chapel Whaley, and Beckton.

The reasons for present practice in both the gas and the coking industries are admirably set out by the authors; and students will find what they have to say of great value. As for the coke oven industry, producer gas firing would in the authors' opinion make considerable inroads on the grades of coke which can be sold at such a price as would bring the cost of producer gas above the value of coke oven gas, which, even when there is an outlet for town purposes, is not worth more than about 1d. per therm. "The application of producer gas firing in the coking industry is likely to be restricted to those cases where the whole of the make of coke oven gas can be sold for specialized industrial or chemical purposes, or for town purposes at unusually high prices." Turning to gas-works practice, the authors trace the gradual increase in the use of breeze with the producer coke, due largely to the extended application of waste-heat boilers. And this breeze-coke mixture is utilized in static producers because of their relatively low capital cost and because their labour requirements are, on the majority of gas-works, no larger than those of mechanical producers. We suggest in this direction, however, that no true comparison can be drawn between the costs of static and mechanical producers unless the savings due to the employment of clean and easily-regulated gas of constant composition are placed to the credit of the latter type of plant. The difficulty at present is to assess these savings at all accurately.

Before terminating this pointer to the contribution of Mr. Rambush and Mr. Townend, we would call attention to the authors' faith in the future of the method of firing steam boilers by producer gas. Producers for this purpose are now available for use with Lancashire boilers or those of the Cochran type, and are designed to gasify gas-works breeze. It is mentioned that the carbon-dioxide content of the stack gases when raising steam from coke breeze can be maintained at between 16 and 18 p.ct., and that the efficiency of steam raising is increased to 75 p.ct.

Accident Prevention

ONE of the saddest events is the loss by a family of the bread winner through an accident which might easily have been avoided. Yet how many accidents of the kind there are. Carelessness—even the thoughtlessness of a moment—is ever stalked by death or mutilation in a world in which mechanical science is all-pervading. If only the victim had done—or left undone—something that would have called for a trifling effort or a barely measurable amount of attention, the accident, with all its terrible consequences, might have been avoided! A pitiable reflection, that makes a blow still harder to bear. If only the lesson had been learned, and profited by, in time! This, then, should be the aim—to teach, and to learn without the bitterness of personal experience. Regarded from any point of view, the matter is one which demands attention. In fact, accident prevention work should be placed second to no other branch of industrial activity. While the employee may lose his all by an accident, the employer, too, may be seriously affected.

The report of the Chief Inspector of Factories and Workshops, just issued, records an increase in the numbers of both fatal and non-fatal accidents; while the prevalence of cases of sepsis, the report says, "can only suggest that there is still great neglect to make adequate use of the first-aid appliances which are now compulsory in every factory." There is thus evidently still great need for the education of employees in the need for safeguarding themselves, and to this end we would commend a booklet published by the Accident Prevention Department of the National Employers' Mutual General Insurance Association, Ltd., of 10, St. Mary Axe, London, E.C. It is entitled "How to Avoid Accidents in the Engineering Industry." Another help in the same direction is the pocket magazine issued by the National Safety First Association, of 119, Victoria Street, London, S.W., as part of a specialized accident prevention service. This consists of an intensive campaign each month against one of the principal dangers of industry. The particular hazard covered this month is "Blood Poisoning," the writer being Sir Gerald Bellhouse, C.B.E., the Chief Inspector of Factories.

A Safeguard to Health.

The open flue is one of the greatest safeguards to health. We reiterate this constantly because of our belief that upon proper ventilation depends not only the prosperity of the gas industry but also, and more important, the well-being of the nation. This, of course, is by no means an isolated opinion, nor, fortunately, is it confined to the gas industry. Yet, because of lack of interest in hygiene, and an over-dose of interest in electricity, there is a growing tendency on the part of builders, whose practices appear to be condoned by an ignorant public, to erect houses with one or more rooms unprovided with any flue. Indeed, to stop smoke pollution, and the

serious effect of this on health, it has been urged recently that the erection of houses with chimneys should be prohibited, and a subsidy given for all-electric houses. In view of this we were glad to notice in "The Times" last Thursday a letter of protest against a tendency so definitely retrograde. The letter was from Sir Leonard Hill. "Up to the present," he wrote, "we have not emerged from the dark age of heating and ventilating our houses, offices, and workshops. We suffer from the discomfort of long-waved infra-red rays which do not easily penetrate the skin, but which warm the surface in an unpleasant dry way; we also suffer from stagnant heated air, which has an ill effect on the respiratory membrane, and which interferes with the natural body heat loss, thus having a depressing and enervating effect. Electric stoves, as at present designed, afford an excess of long-waved dark heat rays, and heat the air of rooms which, for economy's sake, are kept closely shut up. Used as I am to open air, such stoves cause in me feelings of a stuffiness in the head and general discomfort. On the other hand, there have been introduced some new 'clay radiants' for gas fires which are designed on right lines, affording more short-waved infra-red rays, and visible rays of the comfortable penetrating type of radiation which the sun gives us. A properly flued gas fire increases ventilation greatly, and does not fill the upper part of a room with stagnant heated air."

Gas Fire Campaign.

In our Correspondence columns is a letter from Mr. J. H. Brearley on this subject. He asks whether, in view of the vast improvement in design, we can regard the position of the gas fire as subscriber to total gas sales as satisfactory; and he does not leave any doubt as to his opinion on the matter. He raises afresh the question of the potential value of meter inspectors as selling agents, and suggests that the idea of giving a bonus or commission on sales is a good one. Here are his maxims for immediately increasing the gas fire load: Intensify showroom, advertising, and postal activities; give specialized attention to architects, doctors, and other influential publicists; appoint canvassers to scour the whole district; consider the feasibility of a system of bonuses or commission for orders, or inquiries leading to orders; invoke the aid of inspectors, fitters, &c.; push the "portable" business; and do not be afraid of expenditure. Taking the longer view, Mr. Brearley puts forward the following points, among others, which to his mind require attention: Complete census of appliances, kept up to date; permanent canvassing; "portability" of gas fires; and satisfactory flues.

Sale of Coke to Specification.

In our columns to-day Mr. E. C. Evans gives an account of a scheme of purchase and sale of coke to specification which was in operation in 1924 in the Midlands. The basis of the specification was a standard coke containing not more than 19·99 p.ct. of combined moisture and ash; and the results of the trial showed the disadvantages of an arbitrary scale of prices embracing ash and moisture content as the only variables. It is evident, states the author, that there are several technical problems to be overcome before a fair basis of valuation of coke can be evolved; but he believes that the co-operation which has been effected through the various Coke Research Committees in this country will lead to excellent results in this direction.

An American Correspondence Course.

Last week, Mr. J. J. Morgan, Associate Professor of Chemical Engineering at the Columbia University, New York, sent to us a letter, which was published in our correspondence columns, in which he mentioned the correspondence tuition which the University offers to those interested in the gas industry. The men who enrol—up to the present over 1500 men have enrolled for the course—spend from twenty-five to thirty-five hours on each lesson, put in a total of six or seven hundred hours, and are thoroughly enthusiastic about it. The facilities of both the University and the American Gas Association have been employed in producing instruction along practical lines; and in addition to the technical phases of gas manufacture, distribution, and utilization, the correspondence course deals with allied subjects such as accounting, rates, and public relations. The instruction assumes that the student has a good general education and a knowledge of elementary chemistry and physics. The course is offered at a special price to employees of member companies of the Association, and many gas companies have aided financially ambitious employees qualified to take the instruction. The course is conducted under the personal supervision of a faculty member of the University, who directs the reading of papers, gives constructive criticism where necessary on the answers submitted, and advises and guides the student in his progress. In the preparation and presentation of the course the Professor in charge has the assistance of an Advisory Committee, representing the American Gas Association, composed of four eminent gas engineers; and upon satisfactory completion of the course on "Manufactured Gas" a certificate is issued by the Registrar of the University.

PERSONAL

Mr. H. E. Stone, formerly of Birkenhead, is leaving this month to take up his duties as General Manager and Engineer to the Hong Kong and China Gas Company.

Mr. Robert Stewart, Assistant Manager at St. Andrews' Gas-Works, has been appointed Manager of the Auchterarder Gas Light Company, Ltd. Before taking up his new duties, he was presented with a gold watch from the employees of the St. Andrews' Gas Company.

Mr. A. E. Haffner, B.Sc., A.R.C.S., has been appointed to the Gas Light and Coke Company's Gas Research Fellowship, Imperial College of Science and Technology, South Kensington, for one year as from Oct. 1 next, in succession to Mr. S. G. Hill, B.Sc., A.R.C.S.

A happy sequel to the recent outing of the City of Waterford Gas Company's employees to London took place at Waterford last week, when the Manager, Mr. F. J. Edmonds, was presented by the employees with a fountain pen and pencil in case and a casket of cigarettes. On behalf of the employees, Mr. N. O'Regan said that the present was intended as a token of the esteem in which they held Mr. Edmonds, and particularly of their appreciation of his energy in organizing their outings. Mr. J. Smyles and Mr. J. Cantwell also spoke, and Mr. Edmonds, in expressing his deep appreciation of the gift and of the kindly thoughts which prompted it, said that it proved to him that his efforts to foster a spirit of good comradeship in the undertaking had been successful.

Forthcoming Engagements.

[*Secretaries of Gas and Kindred Organizations are asked to assist in making this diary of events as complete and useful as possible by sending the earliest intimation of all meetings.*]

Aug. 19 and 20.—Irish Association of Gas Managers.—Meeting in Dublin.
Sept. 8-11.—Association of Public Lighting Engineers.—Annual Meeting and Conference at Leicester.
Sept. 9.—Federation of Gas Employers.—Meeting of the Central Committee.
Sept. 9.—National Gas Council.—Meeting of the Central Executive Board.
Sept. 11.—North British Association of Gas Managers.—Annual Meeting at Aberdeen.
Sept. 18.—Wales and Monmouthshire District Institution of Gas Engineers and Managers.—General Meeting at Porthcawl.
Sept. 18.—Society of British Gas Industries.—Council Meeting in the afternoon.
Sept. 26-28.—National Smoke Abatement Society.—Annual Conference at Leicester.
Oct. 10.—Manchester District Institution of Gas Engineers.—Visit to the Manchester Corporation Gas-Works at Partington.
Oct. 22-23.—Institute of Fuel.—Annual Conference at the Institution of Electrical Engineers, Victoria Embankment, W.C. 2. Annual dinner at the Connaught Rooms, Great Queen Street, W.C. 2, on Oct. 22.
Oct. 27 to 29.—British Commercial Gas Association.—Annual Meeting at Hull and Bridlington.
Nov. 19.—Society of British Gas Industries.—Autumn General Meeting in London, under the Presidency of the Right Hon. Lord Eustace Percy, M.P.
Nov. 25-26.—Institution of Gas Engineers.—Autumn Meeting at the Incorporated Accountants' Hall, Victoria Embankment, W.C. 2.

CORRESPONDENCE

Gas Fire Campaign.

SIR,—I am glad to be associated with the effort now being made by the "JOURNAL" to arouse an enthusiastic campaign for the extended use of gas fires. When imbued with similar ambition in the early years of the present century, I was held back by lack of confidence in the gas fire as a wholly satisfactory appliance. This induced me to make a long series of comparative tests which showed that, to a substantial extent, my lack of confidence was well founded. These tests were published; and it is with unqualified satisfaction that I look back on the intervening years and see that they so stimulated investigation and research, both by the industry and by the manufacturers, that improvements in construction and design have completely put to rest any doubt as to the gas fire being a thoroughly satisfactory, economic, and hygienic instrument for heating. For many years now there has been a range of choice to suit the most fastidious tastes and all circumstances —if we exclude that of portability, which will be dealt with later.

In view of the vast improvement in design, &c., can we regard the position of the gas fire as subscriber to total gas sales as satisfactory? When this question was recently put to me by a brother engineer, I had no hesitation in giving an emphatic "No." The manufacturers cannot be accused of not providing a satisfactory article, and we are driven to the conclusion that, having a good article to offer, the industry has been too easy-going in its methods of marketing that article.

There is considerable activity and enterprise in the salesmanship branch, but it falls far short of that vigour of which the industry, if it but "stretch" itself, is capable. Even as it is, there is diverse quality in salesmanship, whether viewed from the undertaking or the individual standpoint. If those in the C_3 or "middling" categories can be brought to present A1 standard, the campaign will not be in vain; but we must not rest content with present "A1" standard of selling, taking this as meaning the salesmanship of the most progressive undertakings.

From a census taken at Longwood in 1904 (referred to in my Presidential Address to the Manchester Institution in 1906) it was found that there were only 229 gas fires in use among 4066 consumers. I set those figures against those of another undertaking with which I am associated, and find that, 25 years later, this undertaking has 356 fires in use among 1500 consumers. The relative percentages of fires to consumers are: Longwood, 1904, 5·6; the other one, 1929, 23·7. Taking those figures as reflecting a trend, an increase of over four-fold seems highly satisfactory, viewed superficially. But the true gauge of progress is not how figures compare with the past, but how they show up to possibilities. I suggest that a percentage of 23·7 will stand comparison with average attainment; yet it is profoundly unsatisfactory when we look to gas heating as being a possible substantial contributor to that smokeless atmosphere for which the Smoke Abatement Society pleads so ardently.

How many undertakings are there which can tell from records the number of appliances (owned and hired) which are in use in their several districts? As originator of the census, I feel that, despite Mr. H. H. Creasey's disquisition four years ago on "The Commercial Value of a Census," that great instrument of incentive has still not been adequately recognized. The industry cannot yet even tell its members how many undertakings take a census and how many do not. If a campaign could be started off with the resolve "We have 'X' gas fires now in use; by next year we will make them 'X *plus* Y,'" this would set a mark which, though it might not be reached, would keep the aim ceaselessly in vision.

I now turn to the letters which have already appeared in the "JOURNAL" on this subject, solely for the purpose of enlarging upon some of the points made. It is somewhat surprising that one or two correspondents should have to say in the year 1930 that erroneous ideas are still held by the medical profession, architects, and others as to the hygiene, &c., of the gas fire. Surely by this time local publicity should have developed to the point of leaving no scope for such ill-informed prejudice. We cannot fold arms and expect the "B.C.G.A." to do everything. It is local effort alone that will make personal contact. Circularizing doctors, architects, and others of similar calibre is of little use unless reinforced by the personal interview. Rebuffs are met, but, as it is "dogged as does it," a first repulse should be an incentive to fresh means of attack. From a long talk I had recently with an architect doing big business in a neighbouring city, I was amazed to find him most ignorant of the ventilation value of gas, and of gas fires in particular. This indicates that there are still loopholes in the propagandist armoury, even of big undertakings.

The best way to win the medical profession, architects, &c., is to offer them a gas fire installation "on approval." In particularly difficult cases, it will be found good policy to "give" a first installation, and, judged by potential results, an extremely cheap form of propaganda. It often happens that in their "public" waiting room, doctors will have the only gas fire on the premises, and this is in a condition which can only repel business, and which has probably much to do with the doctor's own prejudices. The fire may be good enough for people awaiting consultation, but it is not good enough for him! Such fires should be visited at least twice a year by the local gas undertaking, and put in order free of cost, even if there is not a general scheme of maintenance in vogue.

Selling contact should be made not only with doctors and architects, but with every individual consumer. To-day undertakings should have records which tell at a glance how each householder in the district stands in regard to gas and electricity, and the state of affairs as to the several purposes to which gas may be applied on the various premises. This brings me to the question of canvassing, upon which the industry has a lot to do yet, if not much to learn.

On removing to Harrogate two years ago, it was a revelation to me how anxious the local tradespeople were to get business contact. On the day the furniture was being moved in there was quite a succession of people of this kind, tactful enough not to worry, but keen to let one know of their existence. Before three day had passed, there had been joiners, gardeners, electricians, furnishers, grocers, milkmen, fruiterers, and even a chimney sweep—the whole totalling thirty or more. Quite recently a friend, on removal from Nottingham, found on arrival in Harrogate a bottle of milk on the doorstep awaiting his arrival here. The milkman who left it had not much to learn about the art of salesmanship. How stands the gas industry by contrast? The day of dignified waiting for business at central offices or showrooms has gone by. The intelligence department needs, generally speaking, considerable extension.

A canvasser or a "squad," according to the dimensions of an undertaking, seems a present-day necessity. Gas undertakings should be as keen to get on the track of newcomers, before their arrival, as they are to make contact with "flits" lest the gas account be left unpaid. Properly organized canvassing would not only scour the district, but would make touch with changes of tenancy. Those who have not yet tried it might profitably emulate Mr. E. F. Keable's example of employing a trained canvasser as a follow-up to posted literature, showroom displays, &c.

It must sink in to the industry that *more has to be spent in seeking business*. There is no mistaking it, we really are in a competitive age. Hardly a month passes but I get circulars from local electricians, occasionally with a stamped reply postcard enclosed, soliciting business of one kind or another. Among the two million unemployed which we have to-day there must be many men with sufficient general education and acceptable personal deportment who, with a little preliminary coaching as canvassers, could open the door to business to be clenched by the more highly-trained technical selling staff. This suggestion is made as a quick way of getting acceleration of business in gas fires *now*, and as a temporary expedient and experiment which will afford useful knowledge towards establishing a canvassing section as a permanent institution.

In "The Manchester Guardian Commercial" of Aug. 7 last, under "A Business Man's Diary," appears the following:

> Economists of the orthodox school will tell you that if a firm is to increase its sales it must cut its prices or improve its goods. Yet I have come across several instances of late where firms have raised their prices without improving quality, and have succeeded in doubling their turnover. The essence of attack is no doubt surprise, and the advertiser has become a past-master of surprise tactics.

None of your correspondents has raised the question of the potential value of meter inspectors as selling agents. The normal practice is for these gentlemen to go quietly into the basement or the cupboard to read the meter, and as silently and unostentatiously depart. Bradford and a few other places rate their value a little above that of automatons reading meter indices. In a quick-selling gas fire campaign, it should not be past ability to invoke the aid of the meter inspectors.

Another phase which has escaped attention is that of giving a bonus or commission on sales, and on inquiries passed forward from inspectors, fitters, &c., which lead to business later. The payments of rewards of this kind is very rife in the electrical industry. And why? Simply to get the business now done by the gas industry. It should surely be worth consideration to operate on similar lines in an effort to extend gas usage. Where nothing of the sort has been tried, an experiment might *now* be made as part of the gas fire campaign, so testing its potentialities.

It has repeatedly been said that good service appeals to a consumer more than a reduction in price. How can a con-

sumer test the economic and other capacity of a gas fire if he does not have one to try? Obviously the first thing is to get a gas fire installed, and if the consumer is satisfied, what matter if it does cost something in canvassing and other charges. In pushing gas fires there is offered an article with which the electrical industry cannot hope to vie. Yet electric undertakings are increasing their heating business, which demonstrates that price of commodity really has but a small share in the selling transaction. In present circumstances the gas industry will need to look less critically on cost of retaining or extending business, trusting to the good service of the commodity more than offsetting any slight addition to commodity price which the cost of getting business entails.

Mr. Shapley expresses the view that manufacturers should assist in combating the problem of the portable electric fire by producing a fire at a much more reasonable figure. Mr. Keable carries this a stage further by showing how he has met the "portable" competition, and is to be heartily congratulated upon his enterprise. Both Mr. Shapley and Mr. Keable have touched on a point which demands much more concentration of thought and endeavour than has yet been given to it. It is safe to say that the element of portability has had more to do with the extended use of electric radiators than any other factor.

To what has been said I would add that the lighter in weight a gas fire which is to be portable can be, consistent with reasonable durability, the better. Also, to induce business, gas undertakings should do the work of providing "plug-in" points (*vide* Mr. Keable's letter published in the "JOURNAL" for July 30) at cost, or even less. In this matter we shall be really making great headway when the "B.C.G.A." can find enough material to devote a number of "A Thousand-and-One Uses for Gas" to it exclusively. We have had lately many days upon which a portable heating appliance would be a "boon and a blessing;" at Harrogate minimum temperatures have often been in the forties, while the maximums were in the lower sixties. Portability is the electric radiator's greatest weapon of attack. Next to lighting, it is the most potent force in introducing business. The moral need not be pointed further.

I fully agree with Mr. W. M. Carr in his views on the relative advantages of simple hire and easy-term hire purchase. There is only to be added that the supervising organization of the gas undertaking must guard against obsolescent fires being kept in use, whether owned by the gas undertaking or by the consumer. One would like to have amplified his observation "The practice of running out gas fire flues at the eaves or discharging into cavity walls has been all too prevalent, and to the great disadvantage of the gas fire." Condemnation of cavity walls we can well understand, and also stopping-off the flue at the eaves; but I take it Mr. Carr has no objection to a flue which is carried slightly above the ridge. There is one form of flue which Mr. Carr does not mention, but which is as iniquitous as the two which he cites, and that is the flue which is carried for a short distance vertically inside, and then carried through (and beyond) the side wall with a horizontal extension piece finished off with or without a cowl. It is impossible for such a flue to function satisfactorily in all conditions of wind and weather, and the sooner the practice is totally discontinued the better.

Bringing the foregoing observations to the focus which will conform to the "JOURNAL's" timely aim of inducing an intensive gas fire campaign forthwith, I summarize the points as follows:

1. Intensify showroom, advertising, and postal activities.
2. Give specialized attention to architects, doctors, and other influential publicists, with, if necessary, special terms.
3. Appoint canvassers to scour the whole district. (This will be needful to avoid interference with normal staff working.)
4. Consider the feasibility of a system of bonuses or commission for orders, or inquiries leading to orders.
5. Invoke the aid of inspectors, fitters, &c.
6. Push the "portable" business for all it is worth.
7. Do not be afraid of expenditure. In other words, be venturesome rather than timorous.

Taking the longer view, the points which I would put for earnest early attention are:

1. A complete census of appliances, kept up to date.
2. Adopt canvassing as a permanent institution.
3. Keep a record of consumers' attitude, after interview.
4. The gas industry, in collaboration with makers, to give consideration to the "portability" aspect of gas fires in all its bearings.
5. Be sure that the flues provided will function satisfactorily. Eliminate those now defective.

It hardly needs adding to the foregoing that there must to-day be systematic inspection and maintenance of all appliances, whether owned by the undertaking or the consumers. So much has been said and written upon that as to leave no excuse for leaving things "to chance."

J. H. BREARLEY.

Aug. 8, 1930.

"Misleading Gas Propaganda."

SIR,—Under this heading a contributor to the "Electrical Times" (July 10, p. 87) criticizes adversely a comparison of gas with electricity for cooking purposes.

This comparison originated from the Liverpool Gas Company, and was given wide publicity in your "Salesman's Diary and Handbook" for 1927. The immediate cause of the criticism at so long a period after the original publication appears to be that the comparison has now reached "Hotspot" (the name of the contributor) in "a circular issued by manufacturers of gas cookers purporting to compare gas and electricity."

I may at once say that I hold no brief for the Liverpool Gas Company, and am, of course, in no way responsible for their selection of this particular case as an illustration of the comparative costs of cooking by gas and electricity. I am simply pointing out that in actual figures published by them they are quite justified in drawing the conclusions they do. It is a question of fact, and not of argument.

The tests as quoted by "Hotspot" are as follows:

Energy Used, and Cost, to Cook the Complete Dinner.

	Gas.	Electricity.
Gas, 45·51 c.ft., or 0·216 therm, at 8d. per therm	1·728d.	—
Electricity, 5·631 units, at ½d. per unit	—	2·815d.
Add payment by rateable value, 5 p.c. per quarter on £20 10s.	—	3·990d.
Cooker and meter rents increase these costs, the respective quarterly rents being	2s. 5d.	7s. 0d.

This shows that electrical fuel costs are nearly four times as great as gas, while the rents are nearly three times as great. In comment, "Hotspot" goes on to say:

> When a gas undertaking is driven to make such extremely incorrect statements as the above, one can only conclude that they must be feeling the effects of electrical competition very badly indeed. In no sense can the sum of 3·99d. be regarded as an energy charge. If that factor must be introduced, it would be as well to have it accurate, and in correct perspective. The fixed charge of 5 p.ct. on £20 10s. is 20s. 6d. per quarter, which works out at 2·7d. per day. This in itself is a very different thing to 3·99d. quoted by the Gas Company. Further, be it noted, the whole of this sum is charged to the cooking of a single meal, it is not even spread proportionately between the whole day's consumption for other cooking operations, lighting, heating, and similar services. Still less is any attempt made to credit the electricity figures with savings effected by the domestic tariff in respect of other uses than cooking,

and so on for half a column more.

How reasonable this seems, and what unscrupulous manipulators the Liverpool Gas Company are made to appear.

Fortunately the Liverpool Gas Company took the precaution of ascertaining exactly what the quarterly consumption of electricity was in this case. It was found to average 347·1 units; and *this figure was quoted on the circular* which "Hotspot" says he has received.

A simple calculation shows that 20s. 6d. per quarter (the rateable value charge) equally divided over 347·1 units amounts to 0·709d. per unit, and that, as the dinner required 5·631 units, 3·99d. was its share of the rateable value charge, as shown correctly in the comparison quoted above.

No further comment is really necessary unless one might suspect "Hotspot" of still maintaining that "in no sense can the sum of 3·99d. be regarded as an energy charge;" perhaps the householder should debit this charge to "household sundries" instead of to "electricity bill." But whatever item he selects, the charge must appear in the household accounts, and by reason of using electricity he will be without the 3·99d. when they are balanced.

ARTHUR FORSHAW.

London, Aug. 9, 1930.

ON THE ELECTRICAL SIDE

A Bouquet.

Writing of propaganda tempts us—at the risk of being charged with immodesty—to quote the opening lines of an article by Mr. Basil Barham in "Electrical Industries," the subject of which is "Getting New Business." We are always of opinion that the gas industry is too modest, and that an occasional reference to the opinions of it entertained by its competitors may assist to dispel this diffidence. Here is what Mr. Barham says: "The gas undertakings of this country have been displaying remarkable activity of late. There is no doubt that their propaganda is extremely well conducted, and both their direct and indirect advertising are well and ably followed up. The work of the electrical supply companies and of the municipally-owned electrical undertakings is, no doubt, quite as well planned. It is not, however, so apparent to the public, nor does it appear to yield such results."

For the Chicks.

There is now a poultry farm where, we are told, half-a-million chicks can be hatched every fifteen weeks on a system which is entirely electrical. For the first eight weeks the chicks enjoy artificial sunlight day and night, and at the end of that period they are brought for the first time into touch with natural surroundings. Instead of the usual grit floor, they walk on wire trays, placed one over another about 6 ft. high, 150 chicks being accommodated on each tray. By this electrical method it is claimed that a chick at five days old equals in development a naturally bred chick eight days old. This is a use to which, as the "JOURNAL" volumes testify, gas has been put for many years past.

Assisted Wiring.

The recent report of a Committee appointed by the Electricity Commissioners, the main features of which were indicated on p. 297 of the "JOURNAL" for Aug. 6, has drawn attention once more to deferred payment wiring schemes—the opinion of the Committee being "that such facilities should be generally available in all areas of supply." At the close of the year 1928-29, only about one-third of the authorized undertakers had incurred expenditure in this direction, and the Committee are fully alive to the fact that universal adoption of the policy would create problems in connection with finance, particularly in the case of smaller undertakings. Birmingham started an assisted wiring scheme last year. Complete installations are made under agreement providing for quarterly instalments, or, alternatively, through prepayment meters, by an addition of 2½d. per KW.-H. for lighting purposes and 2d. for each eight KW.-H. used for power purposes, until paid for. Consumers are given freedom of choice of fittings, shades, and lamps, which are supplied by the Department; the wiring being done by registered contractors.

Rateable Value or Size of House System of Charge.

A second report, which was noticed in the "JOURNAL" at the same time as the one above referred to, made by a Committee to the Electricity Commissioners, recommended a statutory multi-part tariff, to be offered, at the option of the consumer, as an alternative to the flat rate. The choice of the Committee, for the component parts of this tariff, so far as domestic consumers are concerned, falls upon a fixed charge based on the size of the house, with the addition of a charge per unit supplied; the fixed, or service, charge being arrived at by ascertaining the area in square feet of the ground floor by taking external measurements, and then multiplying this area by the number of floors.

Of the various bases for the fixed charge adopted up to the present time, the most general has been rateable value; but the report shows clearly the disadvantages of this method. In this they follow Mr. W. B. McLusky, who a good many years ago now pointed out to the Halifax Gas Committee the fallacy of employing assessable value as the basis of a fixed, or service, charge for gas. Following upon that report, Halifax adopted as a voluntary system a method based upon the size of the house—a piece of pioneering which has been crowned with success. The sister industry has thus the experience of Halifax to guide it. Judging, however, from the discussion of the electricity report which has already taken place, some engineers will relinquish with regret the rateable value method of arriving at the fixed charge for domestic consumption. The change-over of so many undertakings might cause temporary confusion in the minds of a proportion of the consumers; but rateable values for a given size of premises differ widely according to the district, and, when all is said, uniformity in the basis of charge must be an advantage. In cases where the size of house would bear hardly upon the consumer, there would remain the option of the flat rate.

THE NEWS OF THE WEEK

New Business Premises are to be erected in Widemarsh Street, Hereford. The ground floor rooms on either side of the Widemarsh Street entrance are to be occupied respectively as showrooms by the Hereford Gas Department and the S.W.S. Electric Power Company.

A Reduction in the Price of Gas was recommended at a recent meeting of the Services Committee of the Port-Glasgow Town Council when the gas estimates were considered. The recommended reduction is by 3d. per 1000 c.ft. The new rates are: Ordinary meters, 5s. per 1000 c.ft.; prepayment meters, 5s. 6d.; gas engines, 4s. 9d.

Cheaper Gas in the Hedon and Preston districts of the East Hull Gas Company is announced by the Directors to take effect as and from the reading of the meters for the quarter ended June 30 last. The reduction is by 2d. per therm, making the price 10d. per therm, and a corresponding rebate will be allowed on collections from prepayment meters.

An Expression of Sincere Appreciation to Mr. Thomas Wilkinson, Engineer and Manager to the Abercarn Gas Department, was expressed by the Urban District Council after fully considering the report of the Department for the year ended March 31 last. The gross profit amounted to £4938, and, after providing for interest and repayment of loans and income-tax, there was a net profit on the year's working of £271. The sales of gas amounted to 34,566,600 c.ft.—a reduction of only 407,600 c.ft., or 1·15 p.ct., on the previous year's figures. The sales of gas through prepayment meters was slightly greater than the previous year.

Heat Units, Not Cubic Feet, are now the rule in Chicago. The Illinois Commerce Commission have authorized the People's Gas Light and Coke Company, serving Chicago and surrounding territory, to bill customers on a basis of heat units instead of number of cubic feet of gas consumed. The new rate schedules have been entered in view of plans for early completion of a $100,000,000 pipe line to transport natural gas from the Texas Panhandle to Chicago.

An Investigation of Importance to the Gas Industry is announced by the Johns Hopkins University, Baltimore, Maryland, in the publication of "The Origin and Decomposition of Organic Sulphur Compounds under Gas-Making Conditions, with Particular Reference to the Rôle of the Carbon Sulphur Complex." The publication is by John Cromwell Holtz, Ph.D., and is divided into two parts—the first under the main heading historical and the second experimental. The price is $1.00, which covers only the cost of printing and distribution.

Bituminous Pipe Linings, Ltd., of Broad Street Chambers, Broad Street, Birmingham, have registered as a private Company, to acquire certain letters patent and the benefit of certain existing inventions relating to improvements in lining iron and steel pipes; to enter into an agreement with B. Talbot, South Durham Steel and Iron Co., Ltd., Cochrane & Co., Ltd., Stewarts & Lloyds, Ltd., Guest, Keen, & Piggotts, Ltd., Thomas Piggot & Co., Ltd., Arthur Dyson, British Mannesmann Tube Co., Ltd., and Clayton, Son, & Co., Ltd. The nominal capital is £15,000 in £1 shares (5000 preference and 10,000 ordinary).

THE NEWS—*continued.*

The Third Annual Sports of the employees of the Scarborough Gas Company took place last week on the Athletic Ground, and were a complete success, with a very full programme, in spite of showery weather conditions.

A Record Number of entries characterized the Annual Fruit, Flower, and Vegetable Show organized by employees of the South Metropolitan Gas Company who possess gardens. It was held on Saturday, Aug. 9, at the Co-partnership Institute, East Greenwich.

The Annual Athletic Sports in connection with the Plymouth and Stonehouse Gas Company took place at Dunstan Park, Plymstock, on Saturday, Aug. 9. There were close finishes in a number of the events, which were witnessed by a crowd of spectators not slow to show their appreciation. The prizes were afterwards handed to the successful competitors by Mrs. R. J. H. Clark, wife of the Company's Engineer.

The Birthplace of Mr. Philip Snowden (the parish of Cowling) last week rejected two alternative schemes of electric street lighting offered by the Electrical Distribution of Yorkshire, Ltd., and decided to add some further gas lamps. The rejection was on the ground that the cost of the electric schemes was too expensive. The present cost of gas street lighting is, £1 13s. 9d. per lamp for the street lighting season, which is about half the cost of electric lighting, whichever of the alternative schemes had been adopted.

The Rotherham Gas Engineer has submitted a report with regard to the proposal to purchase a boosting plant in order to give satisfactory pressures on the district mains, and it was recommended that this plant be purchased at an approximate cost of £200, including the erection of the necessary building and provision of main valves and connections. The Rotherham Corporation Gas Committee also recommend that a "Connersville" meter of 2 million c.ft. capacity per day be purchased and fixed at the gas-works at a total estimated cost of £600 (including the necessary building).

A Further Reduction in the Price of Gas is announced in the annual report of the Crewkerne Gas and Coke Company for the year ended June 30 last. This will take effect from Oct. 1, and will make the price 3s. 6d. per 1000 c.ft. for ordinary purposes and 3s. for power consumers. This reduction makes the price lower than it was in the year 1914. The revenue account shows a profit of £1460, while the profit and loss account shows an available balance of £2549, from which the Directors recommend the payment of dividends at the rate of 3 p.ct. on the preference shares and 6 p.ct. on the ordinary shares, making 6 p.ct. and 10 p.ct. respectively for the year. The sale of gas during the year amounted to 32,843,300 c.ft.—an increase of 429,600 c.ft.

Petrol from Coal was the topic discussed at the first annual meeting of Petroleum Refineries, held last week. Sir Arthur G. Hazlerigg (Chairman), who presided, said that the Company to-day possessed the only plant of its kind in the country. When it was in full swing they proposed to develop the refining of crude oil and so avail themselves of the 4d. rebate in tax to which home-produced oils were entitled. Colonel W. A. Bristow (a Director) said that last year, from January to June, 401,000,000 tons of petrol were imported into this country, and this year, in the same period, 525,000,000 tons. There would be carried out at the Killingholme Works within the next month the first work on crude coal oil. This would mean that for the first time in the history of this country and of the low-temperature carbonization movement a commercial plant would be in operation converting crude coal oil into petrol and fuel oil.

United Gas Industries.

The first report is now available of United Gas Industries, which last year purchased the main portion of the assets of Willey & Co., and the whole of the shares of J. H. Robinson & Co. (Liverpool), and of Smith Meters, manufacturers of meters, stoves, and general engineers.

The accounts cover the period Nov. 26, 1929, to March 31 last, and incorporate profits and dividends from subsidiary companies, including final dividends declared and paid since March 31 last. The total credits to profit and loss amount to £134,688, and, after providing for interest in respect of purchase money up to the date of the completion of the purchase, writing off the preliminary expenses of £10,960, there remains £37,949.

Dividends at rate of 7 p.ct. on the preference and 10 p.ct. on the ordinary for the four months to March 31 last are proposed, leaving £2398 to carry forward. The balance-sheet shows shares in Subsidiary Companies £698,629, while patents and goodwill figure at £233,230. Stocks stand at £97,161, debtors at £58,780, creditors at £19,539, and cash at £32,635. The issued capital is £1,258,583, of which £549,191 is in 7 p.ct. preference, £682,106 in ordinary of £1, and £27,286 in deferred shares of 1s. each.

A Big Coke Handling Plant.

We learn that the contract for the very extensive coke-handling plant in connection with the installation of coke ovens now under construction at the Beckton Works of the Gas Light and Coke Company has been entrusted to Messrs. West's Gas Improvement Company, Ltd. (Manchester).

The coke oven plant was described in Mr. E. G. Stewart's paper read before the Institution of Gas Engineers at their last annual meeting in June. The coke-handling plant consists of a system of belt conveyors designed to take coke from the ovens to and from a system of screens and storage hoppers, and to and from the yard storage with special machinery for wagon tipping and ship loading, together with facilities for loading to rail and road vehicles.

It comprises 39 belt conveyors requiring a total length of no less than 2¾ miles of belting ranging from 24 in. to 48 in. wide, with capacities ranging from 25 to 215 tons of coke per hour. About 1000 tons of steel is required for the structural work and framing.

A feature of the scheme is the West patent side wagon tipper, two of which are included, each capable of dealing with 25 wagons per hour, equivalent to 280 tons of coke. Each tipper is fitted with an automatic recording Avery weigher. There are seven screens of various types, a coke cutter capable of reducing 36 tons per hour, and five overhead hand-operated screens.

The ship-loader is specially designed to lower the coke without breakage into ships' holds at the rate of 215 tons per hour. The rail wagon-loader is similarly constructed with a hinged boom conveyor to effect the same object.

This is reputed to be the most extensive system of coke-handling machinery ever designed for this or any other country.

Co-Partnership at Aldershot.

At the Annual Meeting of the Co-Partnership Scheme and Hospital and Benevolent Fund of the Aldershot Gas, Water, and District Lighting Company, held to-day, Mr. R. W. Edwards, J.P., Managing Director of the Company, said that it was very gratifying to him to learn from the Sales Department that so far this year they had outpaced, both in gas apparatus fixed (which showed an increase of more than 30 p.ct. over the corresponding period of last year) and output, the records of 1929, which were so substantially assisted by the extraordinarily severe winter. In other departments they were equally progressive, and they had already added some 700 to the total number of consumers during the present year.

Continuing, Mr. Edwards said: Last year, I made reference to the question of Local Government, and to the continual increase in local rates. I hoped that I might have had some message to-day as to the prospects of the future, but the destinies of the various Local Authorities in our neighbourhood are still in the melting-pot. One thing at all events remains manifest—that so long as the Government is oblivious to the fact that it is both anomalous and iniquitous to value a public utility undertaking on any other than a profit-earning basis so long shall we be faced with assessments and re-assessments, objections and adjustments, appeals and apportionments, with all their attendant and appalling waste of time. Until that day of enlightenment and relief comes, and these problems, so far as they relate to the public services, are concentrated under a central independent body, I fear our progress must be very seriously handicapped.

Another thing which is likely to affect us intimately is the Coal Bill which has just completed its tottering passage through an unwilling Parliament. Opinions are probably more divided on this than on any other recent measure, as to the effects likely to be produced on industry generally and public utility services in particular.

I should be unwise to prophesy, though I fear that, so far as its application to public utility services is concerned, it will be very similar to that of the De-Rating Act, which so unfortunately deprived us of our legitimate participation in its benefits. The collieries in different districts vary so completely in their methods of production and in the fields in which their output can be utilized that I fear that an Act which sets out to standardize conditions commences its life under an unenviable handicap. I can only repeat my personal opinion, expressed at one of our Co-Partnership Festivals, that some form of co-partnership in the coal industry would be its best medicine.

With regard to co-partnership generally, it is interesting to note that 15 new schemes were inaugurated during 1929, and, of these, 8 were in gas and electricity undertakings. Out of a total of 321 schemes in operation at the close of 1929, 65 refer to gas, water, and electricity companies—more than 20 p.ct.—the nearest competitor being the metal, engineering, and shipbuilding trades, with a total of 44 schemes.

Turning now to our own scheme, you will notice that the amount of bonus constitutes a record, as also does the sum credited as interest on savings; and in the latter connection I am glad to see that our members are leaving larger sums

on deposit year by year, so taking advantage of the generous rate of interest (5 p.ct. minimum) as compared with the Banks and Post Office. The figures show that members have put away an average of approximately £5 per head during the year; and, although this is quite a fair figure as an average, I should like to see more, especially of our young people, systematically practising that excellent principle of thrift which, while paying them handsomely now, will prove of such inestimable value to them in later years.

The report of the Hospital and Benevolent Fund speaks volumes again of the immense amount of real practical good done during the year; and in spite of the advent of hospital leagues, our fund still holds pride of place in the affections of our workpeople, for not only does it afford every single facility, both to the employee and to his or her dependents, offered by the leagues, but it adds that "little bit extra" in the shape of personal grants from the Benevolent Section, which, by relieving a man's mind of financial anxiety, helps his body to a more rapid and complete convalescence. The fund is extraordinarily well supported by the employees, and you may rest assured that if, as a results of its extended operations, the balance in hand shows a tendency to decline, the Directors will see that the usefulness and scope of the fund are not allowed to suffer—so long as the members do their share. Our Sports and Recreation Club has continued to widen its utility.

I now formally move: "That the report and accounts for the year ended June 30, 1930, be and are hereby adopted."

The motion for the adoption of accounts was seconded by Mr. A. V. BARRACLOUGH (Chief Engineer) for the Co-Partnership Section, and Mr. E. HORTOP (Chief Accountant) for the Hospital and Benevolent Fund; these gentlemen being the respective Vice-Chairmen.

Company Results at June 30.

Grantham.

The 112th half-yearly meeting of the Grantham Gas Company, presided over by Dr. G. A. C. Shipman, received a balance-sheet for the half-year ended June 30 recording a balance in the Company's favour of £5996. Out of this amount the Directors recommended payment of the statutory dividend at the rate of 5 p.ct. per annum, absorbing £1550, and carrying the balance forward to the next half-year. Notwithstanding trade depression, the consumption of gas slightly increased during the past half-year. As a matter of policy, and for accountancy purposes, the Directors had found it necessary to impose a rental on all ordinary meters, but they were happy to announce a reduction of 1½d. per therm in the price of gas as from July 1. The report was carried, an amendment to drop the matter of imposing meter rents and giving a reduction of a penny instead of 1½d. per therm being defeated.

Maidstone.

The accounts of the Maidstone Gas Company for the year show that after providing for all fixed charges (including £2000 for depreciation of stoves and fittings and £1831 for renewal fund) there remains an available balance of £20,913, which, together with the balance of £12,532 brought forward from the previous year, and £230 interest earned on investments, makes a total of £33,677. The sum of £2250 has been transferred to reserve fund, and after providing for income-tax, interest on debenture stock and deposits, and the interim dividend of 4 p.ct. paid on March 1 last, there remains a balance of £18,496, out of which the Directors recommend payment of the final dividend of 4½ p.ct., making 8½ p.ct. for the year. The sales of gas throughout the year have continued satisfactory. As was foreshadowed in the previous report the market for tar during the last financial year has remained in a depressed condition. On the other hand, the revenue from coke has been more than maintained. The work in connection with retort house extensions was completed in October, 1929. The new plant has been in operation and is giving satisfactory results. The Directors decided on the formation of a contributory pension scheme for the Company's staff. The scheme came into operation as from March 31, 1930.

Malton.

The Directors of the Malton Gas Company submit the following statement of accounts for the past half-year. The expenditure on revenue account has amounted to £7723—an increase of £247. And the receipts have been £10,032—an increase of £277—leaving an extra profit earned for the half-year of £30. Coal has cost more, but the increase has been met by the increased receipts from residuals. There was a balance of £3076 brought forward from the last accounts, and after paying income-tax and interest on mortgage bonds the balance available for the payment of dividends is £4987. The Directors regret that owing to the increase in income-tax they have had slightly to reduce the dividend to meet the requirements of the sliding scale. They recommend that 6¼ p.ct. be paid for the half-year, free from deduction of income-tax, which will absorb £1500, and leave £3487 to be carried to the next accounts.

Wellingborough.

The report of the Directors of the Wellingborough Gas Light Company shows that the profit after providing for interest and income-tax, amounts to £3872, and the available balance is £9801. The Directors recommend that out of this sum dividends of 7½ p.ct. on the "original" and 6 p.ct. on the "additional" shares, *less* income-tax, be declared for the half-year. The payment of dividends and tax thereon will absorb the sum of £4206, leaving a balance of £5595 to be carried forward. The Directors recommend that new Articles of Association (based on Table A of the Companies Act, 1929) be adopted in place of the existing Regulations of the Company, many of which are now obsolete and inapplicable.

The Brighton-Worthing Amalgamation.

An Extraordinary General Meeting of the proprietors of the Brighton and Hove General Gas Company is to be held at the Company's Offices, 5, Great Winchester Street, Old Broad Street, E.C. 2, on Friday, August 22 next, at 11 o'clock, when sanction will be sought for the acquisition of the Worthing Gas Light and Coke Company upon terms provisionally agreed; including the issue of stock on the following scale: £110 5 p.ct. standard consolidated stock for £100 Worthing Gas consolidated ordinary stock. £91 13s. 4d. 6 p.ct. "B" preference consolidated stock for £100 5½ p.ct. Worthing preference stock. £80 5 p.ct. perpetual debenture stock for £100 4 p.ct. Worthing debenture stock. The transfer to the Company of outstanding mortgages of the Worthing Company; compensation to Directors, Auditors, and officers of the Worthing Company; and the extension of the Company's statutory powers and obligations to the Worthing Company's area.

The Brighton and Hove General Gas Company supply the whole of Shoreham, Southwick, and Lancing on the west, and the Worthing area of supply embraces the whole of the extended borough and the parishes of Findon and Sompting on the north. The combined area will extend practically from Rottingdean in the east to Goring in the west.

New Holder Inaugurated at Llandrindod Wells.

The history of the Llandrindod Gas Company from its incorporation by Special Act of Parliament in October, 1907, has been one of steady progress, the present sales of gas approximating 15 million c.ft. per annum. Approximately 95 p.ct. of the houses in Llandrindod Wells use gas for one purpose or another, although the Electric Light Company had been established for some years before the advent of the gas-works.

The new gasholder is the first important item of capital expenditure undertaken by the Company since the erection of the works; and it says much for the design of the works by the late Mr. Charles Hunt, M.Inst.C.E., who was the Chairman of the Company from its commencement until the time of his death in March, 1929, that, notwithstanding the continued increase in the business of the Company, additional capital outlay at the works has only now become necessary. The holder has a capacity of 60,000 c.ft., and at the present rate of consumption will provide storage for many years to come. It has been constructed by Messrs. Edward Cockey & Sons, Ltd., of Frome, Somerset, and is now in operation in readiness to meet the increased demand for gas anticipated during the summer months when the Company's greatest consumption occurs. At the gas-works, on July 21, the formal ceremony of the opening of the new holder was performed by Miss Jean Ferguson, of Chepstow. Those present included Mr. C. Holmes Hunt, Chairman of Directors; Mr. and Mrs. Ferguson, Chepstow; Mr. W. F. Rogers, Engineer to Messrs. Edward Cockey & Sons, Ltd.; Mr. W. A. Sims, a Director of the Company, and Mrs. Sims; and Mr. F. W. Croxton, Local Manager.

Mr. C. HOLMES HUNT, in course of his speech, said this was an historic occasion in the life of the Gas Company, as it was the first real item of capital expenditure the Company had incurred since the works were inaugurated in 1909. Having regard to the increase in the consumption of gas every year since the works were opened, the high efficiency of the undertaking, and the excellent design and lay-out of the works, they must acknowledge the foresight and sound business judgment of the late Chairman. The inauguration of the holder demonstrated one solid fact—that gas was not played out to-day. The additional storage provided would meet the needs of the town for many years. He congratulated the firm who had erected it—which, he said, was one of the oldest in the industry in the United Kingdom—on the efficiency and workmanlike manner in which the work had been done. Before sitting down Mr. Hunt presented Mr. Rogers with a solid silver cigarette case as a souvenir of the interesting occasion.

Mr. W. A. SIMS, the Local Director, said the capacity of the holder was three times that of the original one. Mr. Charles Hunt, the first Chairman of the Company, took a very great interest in Llandrindod Wells, and showed his faith in the town by inaugurating this

THE NEWS—*continued.*

Company; and his faith had been justified. He (Mr. Sims) was one of the first consumers of gas in the town, and welcomed the formation of the Company; but little did he think that he was going to be so closely associated with the Company as he had become. In the past the Company had rendered great service to Llandrindod Wells, especially during the years of the war.

Mr. W. F. ROGERS congratulated the Company, on behalf of his firm, on its continued success. The Company had a very able Chairman, and also a very efficient Works Manager in Mr. Croxton.

Corporation Undertakings' Results.

Birmingham.

No new capital for the purpose of the Undertaking has been raised during the year, but the total amount authorized has been increased by £445,600 in respect of the sanctions granted in May, 1929, for mains and services, and October, 1929, for water gas plants, &c., at Windsor Street, Adderley Street and Nechells Works, and the new gasholder at Swan Village. The capital expenditure during the year under review on schemes authorized by the Council was £148,289, making a total expenditure to date of £4,512,715.

The total expenditure on revenue account during the year was £2,075,295—an increase of £52,099. The cost of manufacture has been reduced by £31,329, but under the item "Distribution" an increase of £76,296 is shown. This advance is accounted for by the cost of labour engaged in laying new mains, particularly in connection with the scheme of supplying gas to small house property in the Department's area. The record created last year in the amount of gas sold has again been passed, and in the twelve months under review no less than 14,315,477,700 c.ft. were disposed of, being approximately 369 million c.ft. more than in 1929, which is equivalent to 2·65 p.ct. The net amount received from the sale of gas shows an increase of £20,553, equivalent to 1·08 p.ct.

The new scale of prices which came into operation during the quarter ended March had the effect of reducing the charge to consumers by £25,843 in the quarter. Based upon last year's consumption of gas, this represents £73,665 in the full year ending March 31, 1931.

Rochdale.

The Gas Committee report that the gas sold for the year ended March 31, 1930, is 673,218,800 c.ft. This is a record in the history of the undertaking, and is an increase of 72,468,500 c.ft. over last year. Comparing the gas sold in Rochdale, Milnrow, and Whitworth this year with the gas sold in Rochdale, Milnrow, and Whitworth last year there is an increase of 8,003,100 c.ft. For the year ended March 31, 1929, comparing the same areas, there was an increase of 26,985,600 c.ft. of gas sold. The unaccounted-for gas is 5·73 p.ct. of the gas sent out, and is the lowest since the year 1913. A three-part system to other than domestic consumers was introduced, commencing June quarter, 1929, and 60 consumers had availed themselves of the scheme to March 31, 1930. A total of 535 domestic consumers have adopted the two-part system introduced last financial year. The income from the sale of gas for the year is £119,960—an increase of £12,760. The income from residuals is £33,777—a decrease of £2573. The total income from all sources is £171,654—an increase of £11,687. The total expenditure, apart from interest and sinking fund charges, income-tax, &c., is £142,033—an increase of £4123 6s. 9d. The gross profit is £29,623, and the net surplus for the year is £4525.

Thornton.

The report of the Thornton Gas Undertaking for the past financial year shows a profit of £179. There were 2721 consumers. It was stated that since 1923 the Gas Department had contributed to the relief of the local rates to the extent of 2s. 9½d. in the £.

Notes from Scotland.

Perth Gas Department's Successful Year.

On July 28 last ex-Bailie J. Stewart, Convener of the Perth Gas Committtee, presented to the Committee the gas accounts for the past year, along with estimates for the current year. The accounts showed that the estimated revenue from the sale of gas was £65,300, and the actual was £68,148, being an increase of £2848. Coke brought £264 more than estimated, and tar, pitch, and oils £34 more. There was, however, a big drop in revenue from sulphate of ammonia, the actual income only being £241, against an estimate of £1310. A new item appearing in the revenue in this year's accounts is a sum of £894, being profits on sales of gas cookers, fires, &c. The Convener explained that the profits hitherto had been applied to capital.

On the expenditure side, coal cost £24,782, which was £788 less than was anticipated. There were also savings in wages for carbonizing of about £100, and of £727 on maintenance of works and manufacturing plant, the total saving on the manufacturing side of the undertaking amounting to £1356.

There was a balance in hand at May 15, 1929, of £6614, and at May 15 last this balance had only been decreased to £5285, whereas it had been estimated that there would only be £890 of a balance at May 15 last.

It was decided to apply this balance to a further reduction in the price of gas by 2d. per 1000 c.ft., making the price for the current year 9·7d. per therm, as compared with 10·2d. per therm last year, this being 3s. 8d. per 1000 c.ft. as against 3s. 10d. last year. It is estimated this will leave a balance of £745 at the close of the current year.

The accounts and estimates were approved.

Demonstrating Bye-Products at the Yorkshire Show

In view of the special attention directed by gas-works to the grading and marketing of the bye-products of gas manufacture, the accompanying photograph of the stand of the British Gas Light Company, Ltd., at the Great Yorkshire Show held in Hull on July 16, 17, and 18, will be appreciated by our readers.

HOW GAS ENGINEERS ARE TRAINED IN MICHIGAN - -

Mr. E. S. Pettyjohn, Assistant Professor of Gas Engineering, Department of Chemical Engineering, University of Michigan, recently described in detail the Course in Gas Engineering at the University. This is an abstract of his account, which appeared in the A.G.A. Monthly.

The gas engineer is a comparatively new individual in the old field of engineering. Thirty years ago the gas plants of this country were operated by men who had gained their skill and knowledge through practical experience. These men were the first to realize that this method of training was too slow and tedious to meet the requirements of a growing industry. The necessity for efficiently trained young men to study the problems of the gas industry, and to design and operate gas making apparatus, required the development of a new mode of training.

This need was recognized by the University of Michigan with the establishment of the Department of Chemical Engineering in 1898. By 1900 this Department, through its active head, Prof. Alfred H. White, was able to interest the Michigan Gas Association in the establishment of a Research Fellowship to study the problems of the gas industry. Through this Research Fellowship which has been maintained continuously since its establishment, and which was the first example of collective research initiated by the gas or any other industry in the United States, Prof. White and the Department of Chemical Engineering have been directly in contact with the needs and problems of the gas industry for thirty years.

The student in gas engineering at the University of Michigan is first required to obtain a working knowledge of mathematics, physics, and chemistry, which he then uses in his study of the basic unit operations. He also obtains a working knowledge of engineering mechanics, the elements of mechanical and electrical engineering, and of modern languages and English.

To co-ordinate his knowledge of Chemical Engineering, the student is required to present a thesis, based on individual research into a problem in the particular field of chemical engineering in which he is interested. He plans the experimental work, designs his apparatus, and, in general, acquires the technique of research. These undergraduate problems often have developed into graduate research of projects.

These required problems, with their stimulus to graduate research, have resulted in a complementary development in laboratory facilities.

The research projects which at present are being conducted through the Department of Engineering Research at the University of Michigan include a study of the utilization of bituminous coal in the manufacture of carburetted water gas. This research project is an outgrowth of the Fellowship in Gas Research sponsored by the Michigan Gas Association, which was established in 1900. For the progress of this work, the Marysville Gas Plant of the Detroit Edison Company has been made available. The use of this plant offers the student in gas engineering an opportunity to study the fundamentals of plant operation and of plant management. Three of five projects on the utilization of manufactured gas are sponsored by the Committee of Industrial Gas Research of the American Gas Association.

The Department of Chemical Engineering have further extended the facilities offered for training students in gas engineering by developing, with the Detroit City Gas Company and the Consumers' Power Company, a five-year co-operative course in gas engineering. The programme provides for a preliminary employment period of eight weeks in the summer following the freshman year and two employment periods of seven months each, starting at the end of the second year and in the middle of the fourth year. There are six vacation periods of two weeks each, two in the first year, one in the second, two in the third, and one in the fourth to be used at the discretion of the student enrolled. Students in the Engineering College are given the opportunity to learn the details of the co-operative programme during the freshman year. Those who are interested and who are accepted are employed by one of the companies for the preliminary period of eight weeks. At the end of this preliminary period, the students who have made a satisfactory record and are still interested are formally called upon to enrol in the co-operative course. The student who enrols continues his second year of study in the Department of Chemical Engineering without interruption. He is employed by the company with which he has established relations for the seven months' practice period beginning in July and ending the following February. The student then returns to the University and remains in residence for twelve months' study, which includes two semesters and a summer school. The following February he is re-employed for the second practice period of seven months until Sept. 1, and then returns to the University for two semesters of study.

The companies agree to give the student a somewhat varied employment which will put him in direct contact with the various aspects of gas manufacture and distribution and to pay him at the prevailing rate paid other workmen for the same type of work, but not less than 50 cents per hour. The company also retain the same right to transfer, discharge, or alter the rate of pay of student employees as they do over their regular employees.

The Co-operative Course was first offered last year and has aroused sufficient interest to warrant its continuance.

A New Type of Station Meter

The Brandl-Marischka wet meter is described with illustrations by K. Barth in "Gas- und Wasserfach," 1930, **73**, 721 (Aug. 2). It comprises a bell of special design mounted in a casing in such a way that the bell is constrained to take up a continuous planetary whirling motion whereby each point on the outer surface follows the path of a catenary curve. The bell is divided into four measuring compartments, in each of which are two sections, for inlet and outlet respectively. The gas inlet is underneath the meter, and the gas enters beneath the centre of the bell and is delivered from a central section into the compartment ready in turn to receive it. The tilting motion of the bell against a circular guide rail in the housing is controlled by a synchronously moving water ballast in a cavity of appropriate shape in the top of the bell, and the rotation by the agency of the gas.

A feature of the meter is that a special housing is not necessary, and in addition to the self-contained model an open-air model is available in which the brickwork of the main's subway is used as a reservoir for the water and carries the guide rail, and the bell is covered with a dome-shaped top, a water seal being employed. It is also possible to guard against frost by installing the apparatus underground in a reinforced concrete housing.

The illustrations show a self-contained meter of hourly capacity 350,000 c.ft. and a pressure drop of $\frac{13}{16}$ in. W.G., a meter of the open-air type with an hourly capacity of 420,000 c.ft., a small model of unstated capacity, and details of the bell and of the general arrangement. It is mentioned that meters of capacity ranging from 3500 to upwards of 700,000 c.ft. per hour, and for any pressure are available.

The advantages claimed for the meter are as follows: The meter is capable of verification at any time, and is adapted for use as a standard meter, since its errors are within the statutory limits. It gives accurate measurements independent of the load and independent, within wide limits, of the water level. Friction and pressure losses are exceedingly small, and leaks cannot occur, since there are no valves or sliding parts. It works equally as well with unpurified coal gas or water gas as with purified gas, is not liable to rusting or corrosion, involves but little attention, and has low maintenance costs. Due to the simple construction, installation and dismantling are easy, the only moving part, apart from the dial mechanism, being the bell; and this can be dropped straight down into the casing.

NOTES ON NEW BOOKS

"TECHNICAL DATA ON FUEL."*

Reviewed by T. CAMPBELL FINLAYSON, M.Sc., M.I.Chem.E.

In commending the First Edition of "Technical Data on Fuel" to its readers some two years ago, the "GAS JOURNAL" stated that the book should not merely find a place on their bookshelves, but should rather be at their right hand to help them in their daily work. For a second edition to be required in such a short time shows that the book has been deservedly appreciated, and in its present enlarged form the volume will undoubtedly gain further support.

The "Second Edition" contains approximately one-third more matter. Additions have been made in every section, in some instances to meet specific requests made by users of the book.

A perusal of "Technical Data on Fuel" emphasizes one feature which makes the volume unique—namely, the extent to which the technical or research sections of the large firms or organizations have placed their information at the disposal of the Technical Data on Fuel Sub-Committee of the World Power Conference. There is quite a considerable amount of hitherto unpublished data to be found within the pages of this new edition. For example, on page 140 we find new creep data for various alloy steels, supplied by Imperial Chemical Industries. On page 185 are set out typical properties of all types of coal tar, based on samples examined by the Woodall-Duckham Companies. On page 191 additional new data are given relating to anti-knock rating of various hydrocarbons supplied by the Anglo-American Oil Company. On page 223 is a communication on a criterion for the presence of carbon monoxide in flue gases, contributed by J. Duggan by permission of the Director of Fuel Research.

Quite apart from unpublished work, the Editor has evidently been determined to present his second edition in a thoroughly up-to-date condition, and he has spared no pains in revising the data and introducing a large number of references and extracts from recent publications.

It is difficult to review adequately a volume such as this, covering such a vast subject as fuel technology. Therefore, detailed consideration will be confined to an examination of the extent to which the data of interest to the gas industry have been improved and extended. It is found that a large amount of new matter of great importance has been included. Specific heat data are to be found for tar and tar distillates, coal, semi-coke, and pitch. An important communication is included on the flow of gases through fuel beds. A table is given of the steam flow through nozzles. The thermal conductivity of coal and coke is discussed. A most important table is given on page 162 covering the average properties of typical gaseous fuels, including their specific heats at different temperatures. A nomogram for the correction of volumes of saturated gas is printed on page 164. Data are given on the bulk density and apparent specific gravity of various sizes of dry coals. New information is to be found on such widely varying subjects as the viscosity of coal gas, the latent heat of vaporization of tar distillates, the specific gravity of flue gases, heat losses by convection, and the correct utilization of pyrometers.

This may sound rather like a "Bill of Contents," but it is intended as an indication of the vast amount of new information of interest to the gas industry which is included in this second edition. It is because the volume contains data which are a little unusual and difficult to find elsewhere that makes it so valuable.

Another feature which is important in connection with this book is that it is educative. It does not merely ram data down one's throat with the "take it or leave it" manner, but gives adequate and lucid explanations, in many cases supporting the data with fundamental formulæ, and always with the source of reference. In other words, the book is a miniature scientific encyclopædia rather than a scrap book obtained by the utilization of scissors and paste.

The volume takes the same general form as the first edition; the charts and nomograms are of adequate size so that they may be used with accuracy. The Technical Data on Fuel Sub-Committee, and especially the Editor, Mr. H. M. Spiers (on whose shoulders must have fallen an immense amount of hard work) are to be congratulated on their achievement.

Samuel Butler once wrote that "Life is the art of drawing sufficient conclusions from insufficient premises." A fuel technologist is often faced with this difficulty of coming to some important conclusion with incomplete information. But it is inexcusable to ignore the data collected by others if authoritative and easily obtained. This second edition of Technical Data on Fuel contains a wealth of information of the most authoritative type. It is a pocket research department, and a truly gilt-edged investment to anyone who is interested in fuel technology.

* Technical Data on Fuel. Second Edition. Revised and considerably enlarged. Edited by H. M. Spiers, M.A., B.Sc., F.I.C. Published by the British National Committee, World Power Conference, 63, Lincoln's Inn Fields, W.C. 2, 1930; 284 pp., 12s. 6d. net.

LONG DISTANCE GAS TRANSMISSION.*

The author, who is a keen protagonist of the cause of transmission of gas in bulk, considers fully all the economic aspects of the matter; and the book may be recommended to all interested in the problem.

The possibility of initiating a scheme depends on the cost of the gas, the density of population of the district to be supplied, and the actual and potential demands of the inhabitants, while these have a bearing on the distance through which the supply can be profitably extended in any direction over the area under consideration. The problem of the choice of the most economical size of the mains also involves careful consideration in the light of these factors. Methods of planning schemes are illustrated by the author by means of very detailed calculations for typical districts.

In his survey of the problem as far as Germany is concerned, the author divides the subject into three classes—transmission of gas from the Ruhr coalfields into mid-Germany, regional transmission of gas from central gas-works, and transmission of gas produced by carbonization of lignite at the mines into mid-Germany. Long distance gas transmission would add to the amenities of the inhabitants of many villages at present lacking the benefits of a gas supply, since the schemes contemplate a wide-flung network embracing all districts which can be supplied on a remunerative basis.

The problem is complicated from the economic aspect by the need for a very careful forecasting of the likely rate of increase of gas consumption over a period of years, since on this depends not only the capital cost, but also the possibility of securing an adequate revenue. Nevertheless, it is possible to provide for an unexpectedly large increase in consumption by increasing the pressure when this proves necessary or by laying an auxiliary main. In many cases, the latter alternative is preferable to the installation of a large main at the outset.

A useful bibliography of the literature of the subject is appended.

* "Gasfernversorgung," by A. Kemper, Vol. 23 of the Monographs Kohle—Koks—Teer. Halle, 1930, Wilhelm Knapp. Pp. VIII. + 122. Price, Rm. 10.20 unbound; Rm. 11.80, bound.

THE SOLIDIFYING-POINT AND VISCOSITY OF BITUMINOUS COMPOUNDS.*

The author propounds a theory that the various properties of tars and bitumens which depend on softness can be correlated. In all the well-known tests, such as the determination of the solidifying-point, the drop-point, the ball and ring melting-point, and the Kraemer and Sarnow melting-point, the temperature characteristic of any material for one of these tests corresponds to a definite degree of softness—that is to say, all bituminous compounds at their ball and ring melting-point have the same softness. As regards solidifying-point, the test hitherto employed is unsatisfactory since it involves cooling the material to such a temperature that scratching by means of a finger-nail is no longer possible. The test depends, therefore, to a large degree on the personal factor, and is complicated also by the heat of the finger. The author therefore employs the very refined method recently elaborated by Prof. Hoepfner for the determination of the solidifying-point. The method consists in obtaining a temperature-penetration curve for the material under a load of 450 gms. for 60 seconds with a needle of diameter 0·5 mm. The temperature at which the penetration is 0·1 mm. is taken as the solidifying-point. The specimen in which a fine iron-constantan couple is embedded is cooled in a mixture of alcohol and solid carbon dioxide in a Dewar flask to a temperature lower than the solidifying-point, and the penetration is measured at a series of ascending temperatures, the needle being moved to a fresh spot for each temperature. Temperature is measured by means of an indicator attached to the couple. The temperature corresponding to a penetration of 0·1 mm. [= 1° penetration] is read from the curve which is constructed from the test data. The apparatus is said to give very consistent results with no personal factor.

Ubbelohde's method is used for the determination of the drop-point.

The correlation found by the author is as follows, and holds good with a high degree of accuracy, judging from the numerous results quoted for both bitumens, tars, and bitumen mixtures.

$$R = 0{\cdot}8721\,(D - S) + S$$
$$K = 0{\cdot}6816\,(D - S) + S$$
$$R - K = 0{\cdot}1905\,(D - S)$$

where R is the ring and ball melting-point in °C.
K is the Kraemer and Sarnow melting-point in °C.
D is the drop-point in °C.
S is the solidifying-point in °C.

* Starrpunkt und Viskosität Bituminoser Stoffe," by H. Metzger, Vol. 22 of the Monographs Kohle—Koks—Teer. Halle, 1930, Wilhelm Knapp. Pp. VIII. + 60. Price. Rm, 5.60 unbound; Rm. 7, bound.

In ascending order, these temperatures, of course, follow the sequence S, K, R, D. The author then proceeds to the consideration of viscosity as measured by all the well-known methods—*e.g.*, those of Hutchinson, Engler, and Rutgers, as well as by the E.P.C. and standard apparatus.

For the Hutchinson apparatus, the relation was found to be F (D−S) + S = the temperature at which the consistency is X seconds. F is a factor which depends on X as follows:

X =	2	5	10	20	30	40	50	80	150 secs.
F =	1·520	1·425	1·305	1·200	1·145	1·110	1·090	1·033	0·980

As in the case of the earlier formulæ, all temperatures are on the Centigrade scale.

The above relationship implies that at a temperature equal to the drop-point, all materials have a Hutchinson consistency of 110 seconds.

The results obtained by the author show, however, quite large differences between the observed and calculated temperatures corresponding to a definite consistency, the difference in some cases being as high as 7° C., though the average difference for the 162 results quoted by the author is approximately 2° C. As is well known, a decrease of 2° C. in temperature corresponds to an increase of approximately 50 p.ct. in the Hutchinson consistency; hence the general formula proposed by the author is not nearly accurate enough. It is easy to see why the agreement is not good, the reason being that the Hutchinson figure is dependent on the specific gravity of the material, and that for all products of consistency lower than 110 seconds, or thereabouts, the temperature is higher than the drop-point. There is thus, virtually, extrapolation beyond the range covered by the interval between the solidifying-point and the drop-point, whereas the ring and ball melting-point and the Kraemer and Sarnow melting-point lie within that interval and fairly close to the drop-point.

The author has courageously tackled a very difficult subject, and his book should be of interest to all engaged in the examination and application of bituminous materials.

EQUIPMENT FOR THE TESTING OF REFRACTORY MATERIALS.*

The whole range of apparatus required for the testing of refractory materials is discussed in this useful book, which will be found indispensable in all laboratories engaged on work of this kind, whether they be laboratories of research institutes, consultants, manufacturers, or consumers. The tests dealt with include methods for the determination of particle size, plasticity, viscosity, porosity, specific gravity, permeability, refractoriness, refractoriness under load, thermal expansion, specific heat, thermal conductivity, spalling tendency, strength, hardness, resistance to abrasion, liability to slag attack, electrical resistance, and examination by chemical and rational analysis, spectrum analysis, X-ray analysis and microscopy. Auxiliary equipment such as furnaces, including recent types such as molybdenum and silit furnaces, sawing and drilling machines, grinding machines for the preparation of micro-sections, and pyrometers is also described. Finally, reference is made to the literature in which the standard testing specifications of a wide variety of countries is to be found.

The plan adopted by the author is to give a description of the various types of apparatus which have been employed for a particular test, a reference to a journal in which a full description of the method may be found, the name and address of the manufacturer of the apparatus, and in many cases the names of well-known laboratories in which the apparatus is in use or of the investigators who have carried out important work with it. In most cases an illustration or diagram of the apparatus is included.

Careful perusal of the book cannot fail to be stimulating to manufacturers, who will find much information as to the methods employed by their rivals, and, as a result, will be able to judge whether they are themselves giving sufficient attention to the control of their products.

It is certainly a revelation to find that much apparatus which one might imagine to be in use only by its designer is available in standardized form to anyone who may wish to install it. There will undoubtedly be many instances in which it has been considered desirable to adopt a particular test, but no steps have been taken because it was imagined that it would be necessary to construct the apparatus oneself, make numerous alterations in order to secure successful results, and, in short, waste much valuable time over it.

The author is to be congratulated on the happy inspiration which led him to compile this book, and on the excellent manner in which he has dealt with the subject.

* "Prüfanstalt für feuerfeste Materialen," by L. Litinsky, Vol. 11 of the Monographien zur Feuerungstechnik. Leipzig, 1930, Otto Spamer. Pp. 128. Price, Rm. 7 unbound; Rm 8.50 bound.

Reactivity of Coke*

The Influence of Iron Compounds

One of the subjects in fuel technology over which there has been a considerable amount of heart-burning and controversy, and about which until recently very little was known of fundamental importance, is the study of the reactivity of coke. It is still fairly common to confuse this property with combustibility and ignitability; and it is owing to this confusion that coke is often demanded with properties which are actually not the most desirable for the purposes which the fuel is destined to serve. Thus, while a highly reactive coke is essential in blast furnace practice, it has been pointed out several times previously that for closed domestic stoves and central heating apparatus high reactivity of the fuel leads to loss of valuable combustible carbon monoxide in the flue gases.

Extremely valuable work in connection with this subject has been carried out at H.M. Fuel Research Station in co-operation with the National Federation of Iron and Steel Manufacturers and the Coke Research Committees working under the Federation. This has already led to the publication of three most useful papers dealing with the reactivity of coke. Technical Paper No. 18, published in 1927, "The Reactivity of Coke. 1—Standardized Method of Determination of Comparative Values," contains a description of the standard method developed at the Station for the measurement of the reactivity of coke to CO_2 at 950° C.; and Technical Paper No. 22, "The Reactivity of Coke. 2—The Examination of a Number of Metallurgical Cokes," published in 1929, contains a number of useful results obtained by this method with a comprehensive series of some 78 specimens of industrial cokes. The present paper, Technical Paper No. 25, discusses the influence of inorganic constituents of the coke, particularly iron, on its reactivity. The extremely valuable nature of this paper may be judged from the fact that it has been definitely established that the iron in coke, and particularly the form in which the iron is present, has a most marked, and apparently a predominating, effect on the reactivity.

Briefly, the method adopted for the determination is to heat a standard volume (10 ml.) of the sized coke to 950° C. for one hour in a stream of nitrogen at a prescribed rate, and after further heating for an hour the nitrogen is replaced by carbon dioxide and the volume of carbon monoxide produced from the second 100 ml. of CO_2 used is termed Reactivity I. (R.I.); the volume obtained later, when a substantially constant value is obtained from several successive determinations, is termed Reactivity III. (R.III.).

The paper describes a very ingenious investigation of the effect upon the reactivity of the removal of iron, the addition of iron and iron compounds in several forms, the effect of silica, alumina, titania, and sulphur, the effect of other metals such as manganese, magnesium, calcium, and sodium, and the effect of passage of the coke through the oxidizing zone of the blast furnace.

It is well worth reading in the original if only to note the meticulous care which has been taken in the carrying out of blanks or "control" experiments in order to ensure that no cross interference was obtained through the presence of foreign elements in the determinations.

The following points from the summary of this work and the conclusions arrived at are of great interest.

Those iron compounds which are capable of easy reduction to the metal have an accelerating effect upon the reaction between carbon dioxide and coke, as measured by the Fuel Research method. During the course of a reactivity determination, this reducible iron is present as the metal at the Reactivity I. stage and as ferrous oxide at the Reactivity III. stage. The activating effect produced by the presence of metallic iron is large; that due to ferrous oxide is small.

If a coke is treated in such a manner that the reducible iron is either removed or rendered inert, a close approximation to the Reactivity III. value can be obtained without prolonged

* Department of Scientific and Industrial Research, Fuel Research. Technical Paper No. 25, "The Reactivity of Coke. 3—The Influence of Iron Compounds," by J. H. Jones, Ph.D., A.I.C., J. G. King, Ph.D., A.R.T.C., F.I.C., and F. S. Sinnatt, M.B.E., D.Sc., F.I.C. London: H.M. Stationery Office, Adastral House, Kingsway, W.C. 2; 1930. Pp. VIII. + 42, price 9d. net.

passage of carbon dioxide. Methods by which this can be accomplished are:

(1) Removal of soluble iron compounds by extraction of a coke with mineral acids.
(2) Treatment of a coke under suitable conditions with hydrogen sulphide, silicon dioxide, titanium oxide, and aluminium oxide, all of which combine with the iron and render it inert.

Analytical determinations show that there is a relationship between the amount of reducible iron which a coke contains and the type of reactivity curve which it gives.

A study of equilibrium conditions in the system, carbon dioxide, carbon monoxide, iron and ferrous oxide, enables the phenomenon of reactivation to be explained, and the conclusions with regard to the catalytic effect of iron in the metallic state to be verified. By variation of the conditions prevailing during the reaction, it is possible to cause the transformation of iron from the oxidic to the metallic phase, or *vice versa*, with consequent activation or de-activation of the coke. This transformation has been caused either by variation of temperature, in which case a break is obtained in the temperature coefficient of the reaction, corresponding to the phase change, or by alteration of the CO/CO_2 ratio, in which case, under static conditions, a change in the velocity of reaction is observed.

It has been shown that the phenomenon of "reactivation" (an auto-activation which takes place with certain cokes during the passage of the nitrogen at an elevated temperature) is due to the reduction of iron oxide (by coke) to the metal. This behaviour is only observed with the cokes which contain the largest amounts of reducible iron.

Attention has been directed to the possible effect of inorganic constituents other than iron. The results obtained show that, with a normal coke, the preponderating catalytic effect must be ascribed to the iron.

It may be stated that Reactivity I. represents the reactivity value of a coke under such conditions that the ash can exert its full catalytic effect. Reactivity III. is the value obtained when the iron has been converted to ferrous oxide or otherwise rendered inert, and is a close approximation to the ash-free reactivity value of a coke.

TAMBT.

The Finance Act of Nineteen-Thirty

Being a specially-contributed résumé of the provisions of the Act as they affect our readers.

Part I. of the Act, under the heading of "Customs and Excise," provides for the repeal of section 3 of the Safeguarding of Industries Act, 1921, and the duties imposed thereunder as a result of successful applications made by certain trades to show that goods were being imported into the country at a price below the cost of production (Section 5).

This part of the Act also amends Section 13 of the Finance Act, 1920, as from Jan. 1 next, by enacting that, as from that date, petrol-electric vehicles shall be deemed to be mechanically and not electrically propelled. The amendment has the effect of reversing the ruling given in the case of Tillings-Stevens *v.* Kent County Council (1928), and the reduced licence duties payable in the case of electrically propelled vehicles for the conveyance of goods will not be applicable to the goods vans specially constructed by the Tillings-Stevens Company to come within the scope of such reduction (Section 6 (1)).

Alterations in the rates of licence duty payable in respect of vehicles exceeding 2 tons as from July 1, 1930 (*i.e.*, retrospectively), are also made (Section 6 (2)).

Increase in Rate of Income Tax.

Part II. of the Act continues in force the provisions of the Income Tax Act, 1918 (as amended by the successive annual Finance Acts), and, in spite of great opposition, increases the standard rate of income tax chargeable for the fiscal year April 6, 1930 to April 5, 1931, from 4s. to 4s. 6d. in the £ (Section 8), although in the case of individuals with small income this increase is nullified by an increase in the personal allowance from £225 to £250 and by the relief afforded in respect of the first £225 of taxable income (*i.e.*, after deduction of personal and other allowances) of 2s. 6d. in the £ (section 10); the effective rate of tax in such instance remaining unaltered at 2s. in the £.

The rates of sur-tax payable by individuals are also increased (Section 9), but provision is made for the limitation of the amount of sur-tax payable in the year in which he dies (Section 26). The relief obtainable in respect of life assurance premiums is reduced in certain instances (Section 11), and the loophole for sur-tax evasion previously existing whereby interest payable on loans made by insurance companies for the purpose of paying premiums was subject to relief is now closed (Section 13).

A long debate took place on the provision made for the case of a company which pays preference or ordinary dividends on stock or shares within a month preceding the passing in Committee of Ways and Means of a Resolution of the House of Commons (which has statutory effect, pending the passing of the Finance Bill, by virtue of the Provisional Collection of Taxes Act, 1913), and in ignorance of the appropriate rate of tax to be deducted from such payments of dividend. The section occupies two pages and declares legal a deduction from preference dividends at the previously existing rate of tax, while any over-deduction of tax (in the event of a reduction in the rate of income tax) is to be made good within twelve months after the passing of the Act for the particular year (Section 12).

In the case of ordinary dividends the net amount received by a shareholder is to be deemed to represent income of an amount such as would, after deduction of tax at the amended standard rate, be equal to the net amount received (Section 12 (3)). The following example will serve to show the effect of this sub-section: Assume ordinary shareholder received £80 in May, 1930, in respect of 5 p.ct. dividend on £2000 shares, after deduction of tax at the standard rate of tax of 4s. in the £, operative for the year 1929-30. Standard rate of tax for 1930-31 increased to 4s. 6d. in the £. The gross dividend deemed to be received by the shareholder (before deduction of tax at the revised rate) is arrived at by adding one thirty-first of the nominal amount of the dividend (viz., £100) to that sum, making a total of £103 4s. 6d. It will be seen that deduction of tax at the rate of 4s. 6d. in the £ leaves a net payment of £80; corresponding to the deduction of tax at 4s. in the £ from a gross dividend of £100. For sur-tax purposes, therefore, the income of the recipient would be regarded as £103 4s. 6d.

In connection with the deduction of tax from dividends, &c., it is perhaps advisable to draw attention to the fact that, whereas prior to April 6, 1928, income tax was deductible by reference to the standard rate of tax for the year in which the dividend accrued, Section 39 of the Finance Act, 1927 provided that the deduction is to be at the rate for the year in which the amount becomes due.

New Businesses.

The assessment of new businesses set up or commenced subsequent to the year 1927-28 is dealt with by Section 15, which affords a measure of relief in certain cases where the existing legislation has operated harshly. The taxpayers' present option (in the first year of assessment of a new business) to substitute the actual profits of the year; for the profits assessed in accordance with the Income Tax Acts may be extended to the second and third years of assessment. It is to be noted, however, that, if the option is exercised, it must be applied to both the second and third years, but not to only either the second or the third year. It is further provided that written application to the Inspector must be made by the "person charged," but such notice may be revoked (in respect of both years) on notice being given to the Inspector within twelve months from the end of the third year of assessment (Section 15 (2)), should it be found that the original basis is more equitable or advantageous to the taxpayer. Whether this section will entirely remove the disadvantage under which several new companies have been assessed to tax during the last few years will be seen when the Act comes to be put into practice.

Some considerable amount of discussion took place in the protracted Committee stage in the House on the wide powers given to the Commissioners of Inland Revenue to decide what

period of twelve months shall be deemed to be the profits for assessment (in cases where Section 34 (1) of the Finance Act, 1926, previously applied) during the first three years of existence of a company (Section 14). The 1926 Act has operated somewhat unfairly in many such instances, and the present section was introduced by the Government as a consequence of a recent decision in the King's Bench Division, in the course of which Mr. Justice Rowlatt remarked on the word "customary" in the provisions of Section 34: "I cannot understand it." The Attorney-General pointed out that the object of both the original and the amending sections was merely to avoid the possibility of the manipulation of the accounting periods of companies so as to reduce the proper tax liability, while not restricting the legitimate change-over of dates for business reasons. It was further pointed out that a decision of the Commissioners under Section 14 of the Act of 1930 was not final, and would be subject to appeal under the provisions of sub-section 3 of Section 34 of the Act of 1926.

Section 16 provides that the period during which a notice must be given to the Inland Revenue Authorities under the proviso to Rule 11 (1) of the Rules Applicable to Cases I. and II. of Schedule D of the Income Tax Act, 1918, is extended from 3 months to 12 months following the date of the change (in cases where the change takes place subsequent to April 5 last).

Superannuation Funds.

An amendment (originally moved in 1924) providing for the exemption from tax of the income of superannuation funds, approved by the Commissioners, existing for the purpose of providing annuities and allowances for the widows, orphans, and dependents of members of the Fund (as well as for the provision of annuities for the members) has at last been accepted, and Section 32 of the Finance Act, 1921, is amended accordingly (Section 19).

The expressed intention of the power given to the Special Commissioners to require from any incorporated company or body a certified copy of the whole or part of the entries in the register of stock, shares, debentures, and debenture stock (Section 23) was to supplement the authority of the Inland Revenue under Section 22 of the Finance Act, 1922, to obtain returns of income liable to super tax and sur-tax by extending the provisions to statutory companies. Companies created by Special Act of Parliament are not required to file particulars of stock and shareholdings at Somerset House, and for this reason the section was drafted to include all bodies corporate. A penalty not exceeding £50 is prescribed for failure, on the part of any company, to comply with the notice of the Commissioners—except when it be proved to the satisfaction of the court that compliance was not reasonably possible. A further penalty (of not exceeding £50 for every day during which the default continues) becomes operative when judgment has been given against the company for the former penalty (Section 23 (4)). This sub-section was much debated in Parliament, but it was finally considered that these further facilities should be granted in this definite form in order to prevent evasion of taxation by individuals.

For the extra work which may thus be entailed, a company is entitled to receive payment at the rate of 5s. in respect of each 100 entries delivered to the Commissioners in accordance with the notice (Section 23 (2)), and an attempt to secure the same charge as is payable by other persons under the Companies Act was unsuccessful.

The power given to the General Commissioners, notwithstanding an appeal against an assessment, to arrange for the collection of so much of the Schedule D income tax as is not in dispute (Section 25 of the Finance Act, 1926), is extended to the case of an appeal to the Special Commissioners (Section 24).

The Schedule A valuations adopted for the year 1929/30 are to be taken for the tax year 1930/31 (Section 8 (3)), with the exception of the Metropolis (where the rating valuation is declared to be conclusive for income tax purposes). Provision is made, however, for a Quinquennial Revaluation of properties in Great Britain (excluding London) for the purpose of assessment for the year 1931/32 and each fifth succeeding year of assessment (Section 27 and First Schedule). Certain administrative provisions in connection therewith are also incorporated (Section 28), while, as from April 6, 1931, the ascertainment of the annual value of property in London is amended and the "single basis" of assessment for local rating and Schedule A tax will be discontinued (Section 31). The Inspector of Taxes, however, is given the right to receive from the Assessment Committee for the particular area all returns made under the Valuation (Metropolis) Act, 1869—(Section 32).

An amendment, moved in Committee, to provide that no increase of assessment in the quinquennial revaluation of properties should exceed 5 p.ct. above the previous assessment, was rejected.

The above-mentioned provisions for the re-assessment of property next year do not directly apply to gas undertakings which are assessed to income tax on the basis of profits computed in accordance with the rules of Schedule D, but will be applicable in the case of properties (*e.g.*, showrooms, manager's house, &c.) which are separately assessed under Schedule A.

Amalgamation.

Although Section 55 of the Finance Act, 1927 (which granted relief from capital and transfer stamp duty in the case of the reconstruction or amalgamation of companies), was amended by Section 31 of the Act of 1928, it has been left to the present Act to effect amendments to provide relief in two instances not previously covered. As from the passing of the Act (*i.e.*, not retrospectively) the exemption may be claimed:

(*a*) Where the capital of one or more of the amalgamating companies was authorized prior to 1890 (with the consequence that the provisions of the Stamp Act, 1891, were not applicable in the case of capital issued before the imposition of the duty).

(*b*) Where a company, having already claimed exemption from duty on amalgamating, is involved in a further amalgamation (Section 41).

The former will be particularly useful to statutory public utility companies created many years ago.

A new clause was accepted and incorporated in the Act, which secures that when an amalgamation of limited liability companies necessitates the re-organization of the businesses of the merger, no stamp duty shall, under certain conditions, be chargeable upon the transfers of property necessary for that purpose as between the associated companies (Section 42).

The exemptions from stamp duty on receipts contained in the First Schedule to the Stamp Act, 1891, are extended to include, *inter alia*, receipts given in respect of any sum payable under the Workman's Compensation Act, 1925, to employees (Section 44). The remaining sections of the Act deal mainly with provisions for the National Debt.

Such of the provisions of the Act as relate to matters with respect to which the Parliament of Northern Ireland has power to make laws shall not extend to Northern Ireland (Section 53 (7)).

Unaccepted Clauses.

It is now proposed to summarize certain new clauses which were not accepted but which will doubtless be brought forward again.

A clause providing for the allowance of deductions in respect of inherently wasting assets was once more introduced and received sympathetically by the President of the Board of Trade, who, speaking for the Government, expressed the hope that consultations with Associations representative of industry would continue and result in some point of agreement being arrived at as to the basis on which the recommendations of the Royal Commission on the Income Tax (1920) might be carried out.

Amendments to exempt, partially and conditionally, from taxation company reserves, were moved with the expressed intention of finding a cure for unemployment by means of fiscal relief for industry; and it is to be regretted that the Chancellor's refusal to accept the new clauses leaves little hope that the Government will consider the application of this remedy in the near future.

One proposal was to allow, at an estimated cost to the Exchequer of £2,000,000 to £3,000,000, a rebate of 6d. in the £ on income tax charged on that part of the profits of an incorporated company which was invested as capital in the company—in the form of plant and machinery, land or buildings used for the purposes of the business or in the form of land or buildings constituting mills, factories, or similar premises to which Section 18 of the Finance Act, 1919, applies. (*Note.*—This definition has been held to include gas undertakings.)

A similar clause was moved by the former Chancellor of the Exchequer (Mr. Churchill) on the Report stage, with the object of relieving from tax all money expended during the next three years on the improvement of plant and machinery, thus assisting very greatly in the rationalization of industry. This proposal was fully considered in the "Journal" for July 23.

In moving a further clause, Dr. Burgin said "Its object may be summed-up in one word—acceleration" and placed the cost to the Exchequer at £5,000,000 per annum. The Chancellor would not accept this estimate, and the clause was rejected on the grounds that allowances for wear and tear as well as replacement of plant already existed, and that the proposal would not be immediately effective in relieving unemployment. Apart from the political aspect, the feeling of the House of Commons on this point may be gauged by the fact that the clause was ultimately rejected by the small majority of three votes.

A proposal was put down on behalf of the F.B.I. to amend Rule 7 to Cases I. and II. of Schedule D. By allowing the cost of plant or machinery disused by reason of having become obsolete to be deducted as expenses in any year, irrespective of whether the plant or machinery is replaced it was sought to remedy the existing conditions under which the Board of Inland Revenue will make an allowance for "obsolescence" only when the obsolete plant is replaced—a condition which has operated harshly in many instances where a different class of plant has been installed, as in the case of undertakings ceasing to manufacture gas on entering into an agreement to purchase coke oven gas. The interpretation of Rule 7 was considered very fully in South Metropolitan Gas Company *v.* Dadd (1927).

THE "JOURNAL" TECHNICAL RECORD

Which also contains Full Reports of Meetings of Gas and Allied Associations

The Fifty-Third Congress of the French Gas Industry.

(Concluded from last week's "JOURNAL.")

RECONSTRUCTION OF A LARGE GAS-WORKS.

An account is given by M. Pourcelle of the reconstruction work carried out during the period 1924-26 at the Ivry Works of the Paris Gas Company. The retorts are of the horizontal type, and the daily make is 7 million c.ft. The reconstruction consisted mainly in the complete mechanization of the coal and coke handling in place of the hand labour formerly employed for all purposes, and in the installation of the necessary electrical equipment (including generators) and waste-heat boilers. The cost of the alterations was £100,000, but the net savings effected in labour and other charges in the four years 1926-29 amounted to no less than £155,000. Full details are given of the running costs under the old and new conditions. It seems remarkable that the adoption of modern methods should have been so long delayed in view of the benefits obtained.

OPERATION AND MAINTENANCE OF INCLINED CHAMBERS.

M. Labrune, of Gennevilliers, gives information covering the running of the producers, damper control of producers and settings, scurfing, cleaning of off-take pipes and flues, and repairs to the chambers. The use of a cement gun is advocated for the repair of leaks and fissures. The gun supplies the cement by the agency of compressed air, the necessary water being added at a point close to that at which the cement is to be applied, by way of a tube having an outlet surrounding the tube from which the cement is supplied. The end of the delivery tube is rotatable to facilitate access to all parts of the setting. Details are given as to the composition of the cements used for the repair of both the walls and the recuperators. These are not of general interest, since the installation works at a comparatively low combustion-flue temperature—1100° C.—and is presumably built of firebricks. For use in the recuperators the head of the gun is mounted in a suitable guide.

A setting is due for repair when the ratio of charges missed to charges possible becomes high enough to render the cost of gas production excessive. The methods of operation which have been adopted at Gennevilliers have been such that, during the eleventh year of working of one of the settings, this ratio was as low as 0·24 p.ct.

LOW-TEMPERATURE CARBONIZATION.

M. Mailhe gives results obtained by the carbonization of 100 kg. of coal in 5 kg. charges in a steel tube at a temperature of 500° C. in a current of steam. The coals tested were from Yorkshire (Denaby), Courrières, Liévin, and the Sarre. For comparison purposes, high-temperature tests at 900°-950° C. were carried out with the same coals in retorts at the experimental station at La Villette. Details are given as to the yield and composition of the gas, coke, and tar, and of the spirit extracted from the gas.

The conclusions drawn from the tests are as follows, comparisons being relative to the results obtained under high-temperature conditions:

(1) The tar yield is not quite doubled.
(2) The yield of gas spirit obtained by scrubbing with active charcoal is lower.
(3) The yield of light oils in the tar is, however, greater.
(4) The total yield of gas spirit and light oil is higher, save in the case of Denaby coal, where the yields are the same.
(5) Laboratory experiments indicate that it should be possible to develop a catalytic process for converting the tar acids boiling above 250° C. into hydrocarbons, cresols, and xylenols.

The author takes the view that, though low-temperature carbonization would appear at first sight to be very attractive, some method of treating the heavy oils and tar acids so as to convert them into more valuable products must be found, and an investigation must be made as to the best method of making use of the semi-coke obtained from low-grade coals. The fact that in Great Britain the Gas Light and Coke Company and the South Metropolitan Gas Company are studying several processes of low-temperature carbonization indicates that the best solution of the problem of low-temperature carbonization has not yet been found.

EFFICIENCY OF A CENTRAL STATION OF MECHANICAL PRODUCERS.

M. Nérot, of Paris, contributes a paper on the Marischka producers installed at Clichy. The producers, which have a throughput of 18 tons of coke per 24 hours, are surrounded by a water-jacket serving as a steam boiler with a working pressure of 120 lbs. per sq. in. and are self-clinkering. The body of the producers is 8 ft. 8 in. in height and 6 ft. 7 in. in internal diameter. The portion of the water jacket surrounding the body of the producers is a cell 8 ft. 4 in. in height, and is joined by a system of tubes 2 ft. 1 in. long to an upper cell of height 2 ft. 8 in. The external diameter of the water jacket is 9 ft. 10 in. Producer gas circulates between the tubes and then downwards outside the lower cell. The grate is pyramidal in form, the apex being water-cooled. The gas is purified from tar and dust by a system of scrubbers, and is employed for heating a battery of Woodall-Duckham vertical retorts.

The efficiency determined was the ratio:

$$\frac{\text{Heat of combustion of the cold producer gas + net heat of the steam produced}}{\text{Heat of combustion of the coke.}}$$

The net heat of the steam represents the total heat of the steam generated *minus* the heat of the steam supplied to the producers and that employed for driving the plant.

Tests were made with coke breeze, with coke No. 0 and with coke No. 2, the respective efficiencies being as follows, with reference to the *gross* calorific value of the gas:

—	Gas.	Surplus Steam.	Steam for Driving Plant.	Overall Efficiency.
	P.Ct.	P.Ct.	P.Ct.	P.Ct.
Breeze	83·2	3·4	1·8	84·8
Coke No. 0	80·1	4·0	1·7	82·4
Coke No. 2	79·0	5·8	2·0	82·8

The principal source of loss of heat is the sensible heat of the producer gas, which leaves the plant at a temperature of 400° C. and is cooled, during cleaning, to 40° C. Increase in the size of the coke necessitates a thicker fuel bed, and, with large fuel, the temperature of the gases leaving the generator is higher, and hence the quantity of steam generated per ton of coke is also higher. The volume of gas is increased, but the calorific value drops more than proportionately.

The heat available from the gas thus falls off with increase in the size of the coke; hence more coke must be used to provide the quantity of gas required for the heating of the retorts.

The conclusion is drawn that a central station of producers offers advantages over built-in producers.

DIFFERENTIAL TARIFFS.

In his paper, M. Gros expresses the view that of all the avenues which are likely to lead to an increase in gas sales, the one most worthy of exploration is that of differential tariffs. The increase is not sought for as an excuse to install new carbonizing plant but with a view to levelling-up the off-peak consumption and securing, in addition, an increased demand at all times, so that the plant may always work on a high load. The possibility of being able to obtain cheaper gas leads not only to an increasing demand on the part of existing consumers, but also renders possible new industrial applications for gas.

The total cost of gas manufacture and distribution can be divided into two portions—a fixed cost per cubic foot independent of the make (*e.g.*, cost of coal *less* bye-products) and a variable cost inversely proportional to the quantity manufactured (*e.g.*, capital charges). If extra gas be made it can be supplied at a price low enough to cover the fixed cost and an adequate profit, and a potential new consumer of a large amount of gas can therefore be given a very favourable quota-

tion. This, however, must not be low enough to render injustice to existing consumers. The author explains by the help of graphs the methods which may be employed for the working out of special tariffs and differential tariffs.

The various forms in which sliding-scales, multiple-part tariffs, and special tariffs have been adopted are described, and a summary is given of the methods in vogue in Great Britain, Germany, the United States, and Australia. The summary was largely compiled from information which has appeared in the Technical Press, including the "GAS JOURNAL."

REPORT OF THE COMMITTEE FOR GAS MANUFACTURE.

(1) *Tubular Gas Condensers and Coolers.*

A report on the performance of tubular gas condensers and coolers, the use of which is rapidly extending, was presented by M. Stoss, and gives heat transfer coefficients ruling in a number of installations under different conditions of gas and water velocity, temperature, and size and degree of cleanliness of tubes. The information was compiled from replies to a questionnaire addressed to various gas undertakings, but the data are too few to permit of a mathematical discussion correlating the variables involved. It is hoped that this may be possible at a later date when more information is available.

(2) *Gas Purification.*

The purification of gas was dealt with by M. Leroux; and here, also, the useful procedure of gaining information by means of a questionnaire was adopted. Both the processes themselves as well as the analytical methods used for controlling the operations are discussed. In connection with tar extraction, attention is drawn to the fact that electrostatic methods are being studied and adopted in Germany and in the United States, but have not been introduced into France, even though the fact that they enable the tar to be eliminated from the hot gas is of importance in installations working the direct or semi-direct process for ammonia recovery. It is stated, also, that these methods result in an economy in power, since they do not throw any back pressure on the gas.

Naphthalene scrubbing, where practised, never showed an efficiency in excess of 80 p.ct., the average being about 65 p.ct. The quantity of wash-oil used varied between 6 and 56 gallons per million c.ft. and averaged 18 gallons. The conclusion is drawn that naphthalene removal is not as easy to effect as it might be expected to be. This refers, naturally, simply to naphthalene scrubbing *per se*, since when this operation is followed by benzole extraction, efficient elimination of naphthalene is obtained. The relative merits of gas oil, anthracene oil, and tetralin, and the effect of temperature are discussed.

For removal of ammonia, the quantity of water used varies between 2·3 and 15·6 gallons per pound of ammonia extracted; and it is suggested that an investigation with a view to devising means for reducing the water consumption to a value more closely approaching the theoretical would be useful, since a higher concentration of ammonia in the liquor would result.

Producer Gas Practice from the Point of View of the Carbonizing Industries*

By N. E. RAMBUSH and FRANK S. TOWNEND.

Considering first the coking industry, recent investigation has shown that (apart from blast-furnace gas which does not come within the purview of this paper) coke oven gas is the cheapest source of fuel for heating the ovens. Even at coke oven plants where there is an outlet for the surplus gas for town purposes, the net value to the coking plant after allowing for compression and distribution is not more than about 5d. per 1000 c.ft. (about 0·95d. per therm). This figure is lower than the best figures attained for the manufacture of producer gas. With modern types of producers the cost of producer gas is mainly governed by the cost of the fuel. There is, in fact, no considerable supply of suitable cheap producer fuel at the majority of coke ovens. All gradings of coke down to ½ in.—and in industrial districts to ¼ in.—command approximately the same price. Coke dust below ¼ in., it is true, is practically of no value, but the small amount available is readily absorbed at the boilers of the coking plant. Consequently, the adoption of producer gas firing would make considerable inroads on the grades of coke which can be sold at such a price as would bring the cost of producer gas above the value of coke oven gas.

The main coal supply at a coking plant is usually a highly caking coal, and this coal is not the most suitable type of fuel for gas producers in considering an alternative to coke.

Except in individual circumstances, heating of coking plants with producer gas will not be adopted under the present economic conditions. The application of producer gas firing in the coking industry is likely to be restricted to those cases where the whole of the make of coke oven gas can be sold for specialized industrial or chemical purposes, or for town purposes at unusually high prices.

THE GAS INDUSTRY.

When we turn to the gas industry, the economic factors have tended in the opposite direction. Gas has been, and still is, more valuable to the gas engineer than coke. This holds good in spite of the greater importance which gas coke has assumed of late years. Without exception, gas-works in Great Britain use producer gas for heating the coal gas installations.

In the two instances of gas-works having coke oven installations—Saltley, Birmingham (now dismantled), and Beckton, London (in course of construction)—the batteries have been arranged for producer gas firing.

PRODUCER FUEL ON GAS-WORKS.

As in the case of coke ovens, there is, in general, a ready sale for all grades of gas coke down to about ⅜ in. size at maximum prices, and the only cheap fuel on gas-works is the breeze below ⅜ in. It is of interest to trace the gradual increasing use of breeze with the producer coke during the last few years. Before the introduction of the vertical retort, horizontal and inclined retorts were universal. The producer fuel was hot coke pushed straight from the retort into the producer. With the use of vertical systems of retorts, the use of cold coke in producers permitted of unscreened coke being utilized. With intermittent vertical chambers, an increased proportion of fine coke can be charged in the producers, since, when unscreened coke is taken direct from the quenching tower, it contains the breeze pad which is used to keep the bottom chamber door cool. This, which may all be below ⅜ in., may comprise more than 10 p.ct. of the fuel used, and is in addition to the amount of fine coke produced in the normal handling of the charge to the quenching tower. Thus there has been a progressive increase in the amount of low priced fine coke charged into the producers of gas-works.

TREND OF STEAM-RAISING PRACTICE.

The possibility of charging a still greater proportion of "breeze" (fine coke) into gas-works producers is being considered as the result of the extended application of waste-heat boilers to carbonizing plants. This is directly reducing the outlet for breeze as a fuel for the works boilers.

The average total steam requirements of a gas-works amount to about 1000 lbs. per ton of coal carbonized. To produce this quantity in steam boilers requires the consumption of about 170 lbs. of breeze per ton of coal. The waste gases from horizontal and intermittent vertical chamber settings are almost able to produce this same amount of steam, and non-recuperative continuous verticals are able to raise up to 1500 lbs. of steam per ton of coal carbonized. To cover the steam requirements of gas-works having horizontals and intermittent verticals, very little steam other than that provided by the waste-heat boilers is required; and in the case of non-recuperative continuous verticals the whole of the works can be supplied by waste-heat steam.

If, therefore, it can be arranged that the producers of the carbonizing plant can gasify the whole of the "breeze" (fine coke) produced, then the heating and steam power requirements of the whole gas-works can be provided from this one source in a most economical manner, as regards labour, capital cost, and general convenience.

TYPES OF PRODUCERS.

Of the two main types of coke burning producers—namely, the brick built static type and the mechanical grate central producer—British gas engineers have hitherto preferred the former. There are, at the most, only four gas-works in which mechanical producers are installed. The attraction of the brick built static producer not only in itself, but also because it requires no producer gas recuperators, lies in its comparatively low first cost, its high thermal efficiency, its flexibility, and its non-mechanical nature. Formerly, it required considerable and arduous attention at clinkering times, and it was restricted to the gasification of large screened coke. By attention to the principles of sound design, this reproach has largely been done away with. On plants of capacities most usually suitable for the majority of gas-works, its labour requirements are no larger than those of mechanical grate producers. Its

* From a paper before the World Power Conference, Berlin, June, 1930.

chief disadvantage is that the gas is not clean from dust, and with certain types of coke the deposition of dust in the heating chambers is a matter of serious import.

The producer grates of a Woodall-Duckham continuous vertical retort installation are of the step-grate variety, the details of design of which have been arrived at after some years of experiment. It has been found that the angle of the grate, the relation between the grate and the curtain arch at the back of the producer, and the angle of the back wall of the producer, all have a bearing on the production of a good quality producer gas with no clinker troubles. The shape of the grate, which should be wide, is also an important factor. The grate can either work under natural draught, the air being admitted through slides in the closing doors; or air can be injected under slight pressure by steam injectors. This latter device enables coke containing increased quantities of fines to be gasified.

Normally, the producers work on unscreened coke containing about 16 p.ct. below ¾ in. To determine the possibility of using "breeze" (fine coke), a week's test, in which the quantity of "breeze" was increased to 43 p.ct., was run, the results of which may be of interest.

Average daily throughput of coal (whole of plant) . .	261·4 tons
Gas made, therms per ton	76·57*
Total amount of coke and breeze mixture (including moisture and ash) used in producers per day . . .	35·75 tons
Percentage dry ash-free coke	85·7
Dry ash-free coke gasified per sq. ft. of grate area per hour	9·0 lbs.

* 1 therm = 100,000 B.Th.U.

The proportion of breeeze used was limited by the amount available—a greater proportion could have been gasified. At one other smaller works, the same type of producer is gasifying the whole of the breeze produced. While it is recognized that the rate of gasification is low, the investment charge per unit of throughput is also low.

Mechanical Producers.

British gas engineers have not hitherto been sufficiently attracted to the use of mechanical producers. The advantages of having a constant supply of clean heating gas, subject to very close regulation and the elimination of the heavier manual attention to the producers, have not been considered sufficient to counterbalance the increased capital cost of external producers plus producer gas recuperators. It must also be admitted that gasification of "breeze" can only be carried out in commercial forms of mechanical producers by a serious reduction in throughput.

During the past two or three years, however, there has been a revival of interest in the application of mechanical producers to carbonizing plants, and at the present time there are examples of mechanical producers in connection with horizontals, intermittent vertical chambers, continuous verticals, and in the course of the next year an installation of mechanical producers will be put to work heating a battery of coke ovens. The future extension of mechanical producer plants will doubtless be largely determined by the experiences at these places.

From the point of view of using low-grade fuel, the producer plant at the Beckton Bye-Product Works is of considerable interest. There are two producers 10 ft. internal diameter fitted with Lymn-Rambush mechanical grates. These are of special design to subject the clinker to a crushing action and to maintain the bed in a constant and even up and down motion. The grate also balances the stresses of the crushing motion and cuts down the wear and tear which otherwise rises from this action. The lower section of the shell of the producer is formed into a water jacket, from which hot water for heating and boiler feed purposes is obtained. The fuel is fed into the producer through a central cone valve, which is surrounded by a sleeve which extends into the producer.

From the producers the gas is conducted to the base of a vertical cooling tower and washer, where it is cooled by intimate contact with water. This cooler is of the Lymn patented static type. It consists of a vertical mild steel casing in which are a series of inverted truncated cones which act as water collectors. A central fixed shaft supports a series of distributors. Falling by gravity alternately from distributors to collectors and *vice versa*, the thin sheets of liquid are atomized, and in the form of a fine spray are driven by the gas which flows in a zig-zag upward direction on to the collectors and distributors, where the spray again forms into sheets of descending liquid. Intimate contact between gas and water is therefore obtained without any mechanical device. After passing through the static washer-cooler, the final traces of tar and dust are removed in centrifugal fans.

The gas at the plant is used for heating furnaces and for gas engines. The fuel used is a mixture of "pan ash" (the ashes from producers and furnaces) and small coke. The analyses of the materials are as follows:

—	H_2O.	Ash.	Combustible Matter.
Pan ash, p.ct. . . .	8·7	53·1	38·2
Small coke, p.ct. . .	21·0	14·0	65·0

The average amount of this material fed to each producer per day is 14·4 tons with a maximum of 20 tons. The average rate of gasification is about 8·75 lbs. of combustible matter per sq. ft. of producer area per hour.

Another example of a producer plant constructed by the same Company (the Power Gas Corporation) is that at the Wandsworth Gas-Works, heating an installation of intermittent vertical chambers. The plant is similar to that described above, with the exception that the lower part of the shell of the producer, which is 8 ft. 6 in. internal diameter, is used as a high-pressure steam boiler. There is also a high-pressure waste-heat boiler through which the hot producer gases pass after leaving the producers. The fuel gasified is small coke about 1 in. to 1½ in. in size, and the normal throughput is 12·5 tons per producer per day. This is equivalent to 20·6 lbs. dry ash-free coke per sq. ft. per hour, though on this grading of fuel the throughput can be increased considerably above this figure as necessity arises.

At the gas-works of the Chapel, Whaley, and District Gas Company, there are two Koppers mechanical producers installed for heating an installation of Koppers continuous vertical chambers. The producers are of the standard type made by this Company. The feeding device consists of a centre bell with a three-wing distribution chute. The shell of the producer is in the form of a water jacket under slight pressure so that corrosion of the shell due to condensation is avoided. The internal diameter of the producer is 7 ft., and the nominal rating is 14 tons per day, which on a 75 p.ct. dry ash-free coke basis, is 25·5 lbs. per sq. ft. per hour. Each producer is, however, called on to do only about half this quantity.

A feature of this plant is the separate storage in hoppers above the producer plant of coke nuts, "breeze" above ⅝ in., and coke dust below ⅜ in., so that comparative uniformity of the fuel by "sandwiching" the different grades can be obtained.

The producer plant at present under construction at the Beckton gas-works consists of nine Koppers producers arranged for gasifying coke breeze for the supply of cold clean producer gas to a 1200 tons per day coke oven plant of the Koppers type.

There is an installation of "Trefois" producers in connection with a horizontal gas retort installation at the Partington Gas-Works. A trial installation of this type of producer gasified "breeze" produced from horizontal retorts, which in size was all below 1 in. The total throughput per unit producer was 11·8 tons of breeze containing 16 p.ct. moisture and 13 p.ct. ash, or approximately 7·6 lbs. dry ash-free coke per sq. ft. per hour.

Producers Attached to Steam Boilers.

This is a development which holds out considerable promise, although to the authors' knowledge it has not been adopted in the carbonizing industries in Great Britain. The protagonists of this method of firing steam boilers are the Wollaston Gas Producers, Ltd. (Manchester). This Company have developed a producer which takes the place of the grate of the Cochran type of boiler. A further and more recent development is the producer attached to a Lancashire type boiler. These are specially designed to gasify gas-works breeze. When it is desired to gasify coal, a pre-heating chamber fitted with stirring arms is used, where the volatile matter is driven off without the caking of the fuel.

By gasifying the fuel first to producer gas and afterwards admitting air for combustion, a closer regulation of the combustion can be obtained than when the fuel is burned in thin layers on the ordinary or even mechanical grate. The CO_2 content of the stack gases when raising steam from coke breeze can be maintained at between 16 and 18 p.ct. and the efficiency of steam raising increased to 75 p.ct.

Trend of Development in Mechanical Producers.

The main trend of present development is in the improvement of the thermal efficiency and in improvements in the utilization of low-grade coke. Attention is being given to the pre-heating of the air blast by means of the sensible heat of the producer gas. Even after these have passed through a waste-heat boiler, there is sufficient heat still left to pre-heat the air blast to about 150° C. By a combination of low-pressure steam boiler jacket and high-pressure waste-heat boiler with air blast pre-heater, the thermal losses may be reduced practically to radiation and convection losses and to mechanical loss in unconsumed carbon in the ash and the dust blown over. With the combination outlined above, it is expected that the heat in the gas plus that in the steam will represent 92 p.ct. of the heat in the original coke. Based on using a coke containing 10 p.ct. moisture and 16 p.ct. ash, it is anticipated that the steam production will equal 830 lbs. low-pressure steam from producer jacket per ton of moist fuel gasified and 2130 lbs. high-pressure steam from the waste-heat boiler per ton of moist fuel gasified.

The development of a method of gasifying coke breeeze where the capital cost of the producers plus the cost of producer gas recuperators can be brought nearer to the cost of static brick-built producers would provide a powerful impetus for the British gas industry to reconsider their present practice. Should such a development come about, there is a large field for the application of mechanical producers in the gas industry.

Purchase and Sale of Coke to Specification*

By E. C. Evans.

A scheme of purchase and sale of coke to specification was in operation for some time in 1924 in the Midlands of Great Britain, comprising the iron producing areas of Lincolnshire, Nottinghamshire, South Yorkshire, and Northamptonshire.

Conditions in this area are not favourable to the iron and steel producers with respect to coke supplies in that:

(1) The coke produced within the area is not sufficient to meet the requirements of the iron and steel producers in the area, necessitating the importation of coke from other districts (Durham and South Wales).

(2) The coke available is made in a number of coke oven batteries of comparatively small capacity (about 300 tons per day) with an average carbonizing capacity per oven of about 5½ tons of coal per day.

(3) These batteries are erected for the most part near to the collieries and only in a few cases are they erected near the blast furnaces. As much of the coke is naturally weak, a large proportion of breeze is produced during transit from the coke ovens to the blast furnaces.

(4) The coals available for coking vary considerably in quality so that the character of the coke as supplied to the furnaces is very variable.

Under these conditions the iron and steel producers naturally welcomed the suggestion of purchase of coke to specification, and this was agreed to by the producers for an experimental period extending over several months.

The specification as adopted jointly by the coke producers and consumers was on the following broad lines:

(1) The price of coke purchased and sold was based on a standard coke containing not more than 19·99 p.ct. of combined moisture and ash.

(2) For every 1 p.ct. of moisture and ash above the standard the price of the coke was reduced by 4d. per ton. For every 1 p.ct. combined moisture and ash below 19·99 p.ct. the price was increased by 4d. per ton down to 10·99 p.ct. and by 5d. per ton for each 1 p.ct. reduction below this figure.

Samples of coke were taken by independent analysts during the period agreed both at the coke ovens and the blast furnaces.

The results of this trial are of interest as indicating the difficulties experienced and the disadvantages of an arbitrary scale of prices embracing ash and moisture content as the only variables.

One of the early difficulties experienced arose from the fact that the moisture content of the coke when sampled at the ovens differed from that at the blast furnaces. Differences at the outset were frequently very considerable, but as experience was gained—especially with respect to sampling—it was found that, on an average, coke arriving at the blast furnaces contained about 3 p.ct. more moisture than when it left the coke ovens. Ash determinations were, on the whole, in agreement.

Iron Producers' Difficulty.

The principal difficulty experienced by the iron producers, however, lay in the variation in physical quality in the various cokes on arrival at the blast furnaces. While no laboratory method was in general use for determining physical quality, the sizing tests of coke on arrival, together with empirical qualitative methods as used by the blast furnace manager, were sufficient to indicate a very wide variation in the cokes purchased, and this was reflected in the results of blast furnace operation.

The basis of purchase made no allowance for this factor with the result that a coke of inferior physical quality, the use of which was accompanied by high fuel consumption in blast furnace operation, but having a lower moisture and ash content, sometimes fetched a higher price than excellent cokes physically, but of lower fixed carbon content.

Under the blast furnace conditions prevailing in this area, with a burden (other than coke) approaching 80 cwt. per ton of pig and a slag yield of nearly 30 cwt., it has been found that the physical quality of coke plays a most important part in determining fuel consumption. Further, at works located some distance from the mines as much as 15 p.ct. or more of the coke might consist of material below 1¼ in. size.

It is felt, therefore, that if a scheme of purchase and sale of coke to specification is to be useful both to the iron makers and to the coke producers, some provision must be made for evaluating the physical quality of coke.

This question has been under consideration by Coke Research Committees in Sheffield, Newcastle, and Glasgow, for some time.

Shatter Test for Determining Coke Quality.

A number of methods of examining the physical quality of coke have been investigated; but the method which appears to give results most in accordance with the values set upon cokes by blast furnace managers as the result of practical observation is the shatter test adopted by the American Society of Testing Materials. Opinions in the various areas are by no means unanimous as to the value of this test. In the Midlands the cokes vary widely in their physical quality (the shatter indices of cokes arriving at one works may vary from 48/69 to 90/96) on the 2-in. and 1½-in. screens respectively, and in this area blast furnace and coke oven managers are for the most part agreed that the shatter test though empirical is a fair basis of evaluating physical quality.

In the Durham area, however, where the cokes are as a rule of much higher physical quality, while the shatter indices do not vary so widely, doubts have been raised both by producers and users as to whether the shatter index is a true basis of valuation.

The subject is still under investigation, and no definite pronouncement can be made. Possibly the reason for this divergence in opinion may be found in the suggestion that if the shatter index reaches a certain limit—which has yet to be determined—any further increase would not be accompanied by improvement in blast furnace practice, and might, in fact, be masked by other factors. At the same time, for weak cokes, with shatter indices below this limit, it might be a valuable criterion of coke quality after allowing for other factors.

The best method of determining and expressing shatter index has been the subject of much study by the three Coke Research Committees. The test is an empirical one, and, if results are to be comparable, a standard method of testing must be adopted. The agreed procedure recommended by the three Coke Research Committees was published in the "Journal," Vol. 190, p. 88.

Valuation of Coke on Chemical Properties.

Consideration is also being given to the adoption of a more scientific basis of valuation of coke based on its chemical composition. Moisture, ash, and sulphur have to be taken into consideration in this respect. Moisture can probably be regarded as an inert material, the price variations due to moisture being determined simply in accordance with the alteration of fixed carbon resulting from a change in moisture content.

Ash.—The effect of ash, however, is different. A 1 p.ct. increase of ash not only decreases the fixed carbon content of coke, but also increases the slag forming constituents, necessitating additional quantity of fuel for melting these. The effect of ash has been investigated by a number of observers, but possibly the simplest expression of the effect of ash is that given by the Blast Furnace Committee of the Iron and Steel Institute in their recent report as follows:

> It is more generally accepted that in the case of all furnaces, excepting possibly those using particularly high yielding ores, an increase of 1 p.ct. of ash in round figures is equal to a 2 p.ct. decrease in coke value, due to the necessity of melting the ash which has replaced 1 p.ct. of carbon in the coke.

Sulphur.—In the Midland area, where this subject is under consideration, the ores smelted are of a character which yield considerable quantities of slag—24 to 30 cwt.—and under these conditions the effect of sulphur in coke is not so important as it is in districts where purer ores are being used, so that no attempt has yet been made to allow for sulphur content in coke valuation.

Sampling.—Lastly, the question of sampling coke is one that requires investigation. At the coke ovens, this is comparatively easy, but accurate sampling at the furnaces presents certain difficulties if results are to be obtained comparable with those obtained at the coking plants.

It is evident that there are a number of technical problems yet to be overcome before a fair basis of valuation of coke, taking into consideration physical and chemical properties, can be evolved. The co-operation, however, that has been effected through the various Coke Research Committees in Great Britain between coke makers and users is already leading to results which are of service not only in attempting to evaluate coke on the basis of its properties, but in securing a greater uniformity in the character of the coke made in the different districts and thus reducing the variables which have to be allowed for.

* From a paper before the World Power Conference, Berlin, 1930.

Methods of Collecting Gas Statistics in the United States*

By P. Ryan.

The American Gas Association is essentially the trade association of the gas industry. As stated in its constitution, one of its major objectives is to advance to the highest efficiency the methods of manufacture, distribution, utilization, sales, and accounting employed in the gas industry and to collect, coordinate, and disseminate ideas and information for the purpose. Its membership includes about 650 gas utility corporations and 5000 individuals. The member companies of the Association represent about 90 p.ct. of the manufactured gas business of the country and a somewhat smaller proportion of the natural gas business.

The statistical activities of the Association may be considered under two general phases. There is first the gathering and collection annually of the general statistics of the industry—such as plant capacity and data on production, sales, customers, and bye-products, together with a detailed income statement and balance-sheet. The collection of financial statistics for the industry is facilitated greatly by the fact that most gas companies follow a uniform system of accounting. This uniform accounting system in practically its present form has been in effect since 1920. It was prepared jointly by the American Gas Association and the National Association of Railroad and Utility Commissioners. While in general the set-up of this system is such as to permit direct comparison of the financial operations of gas companies throughout the country, there are one or two items where it permits of variations which are somewhat troublesome from a statistical standpoint, the most important being the method of handling depreciation. Most of the data outlined above are published in bulletins issued from time to time by the Association. In addition, there is published each year a pamphlet which shows the gas rate or rates for practically every community in the country that is served with gas.

In addition to such annual data, there is also collected monthly data on production, sales, and revenues from companies representing about 80 p.ct. of the manufactured gas sold. The publication of these current monthly data on operating and financial trends within the industry has been of great value, not alone to the industry itself, but to the financial and investment community.

The collection of statistics on the gas industry is somewhat complicated by the interrelations of this industry on the one hand with the coke and steel industries through the purchase from these industries of bye-product coke oven gas, and on the other with the petroleum industry through the utilization of natural gas, the production of which might almost be said to form a joint product of the petroleum industry.

Statistical data on the production of bye-product coke oven gas are compiled by the United States Bureau of Mines, which also collects information on the production of natural gas and its chief bye-products, carbon black, and natural gas gasoline. The Bureau of the Census compiles certain data on manufactured gas, but the most comprehensive source for information on this industry is the American Gas Association.

It should perhaps be explained at this point that while the Gas Association's membership of 650 companies represents the overwhelming bulk of the industry, the statistical activities of the Association are not confined to member companies, but attempt to cover every gas company in the country, including municipally-owned plants. Since there are approximately 970 manufactured gas companies, about 550 natural gas companies, and nearly 150 holding companies, it will be seen that the collection of adequate and comprehensive statistics on the gas industry involves reports from more than 1700 companies.

Educating the Industry.

In attempting to educate members of an industry, the question usually arises as to the value of trade association statistics. In an attempt to answer the question, an analysis was undertaken of the hundreds of inquiries received yearly at headquarters in New York for information on the gas industry. About 40 p.ct. of these inquiries were from general and miscellaneous sources, such as advertising agencies, chambers of commerce, trade associations, and governmental bureaux, requesting general information on the industry. About 20 p.ct. were from financial houses which were interested in the securities of the gas industry. The remaining 40 p.ct. were from gas companies themselves, which usually wished information of a sort that would enable them to compare their own operations with the results achieved by the industry as a whole. Needless to state, this last group required no explanation as to the value of statistics on their own industry, and it is the same group of the larger and more progressive companies that has been most instrumental in bringing to the smaller and less progressive concerns a realization of the value and necessity of statistics in their own enterprise.

This leads naturally to a consideration of the second major phase of the Association's statistical work, which might be grouped under the general head of special studies, most of which have as their objective a comparison of some phase of the operations of the individual companies with the performance of the industry as a whole. Some indication of the diversity and range of these studies is afforded by some of the statistical publications issued during the past year. One of these was a bulletin dealing with the economic aspects of the coke situation during the year. In the manufacture of approximately each 15,000 c.ft. of coal gas, there is also produced about one ton of coke. While some gas companies consume this coke themselves in the further production of gas, within recent years there has been a marked tendency for gas companies to sell increasing quantities of this coke in the local fuel markets, where the coke brings a higher return and lowers correspondingly the cost of the gas produced.

It has long been recognized that public utilities as a group have an exceptionally slow turnover of the capital invested in the enterprise. The average gas or electric company commonly has four or five dollars invested in plant for each dollar in annual revenue. It is therefore of the utmost importance that plants be utilized to the fullest possible extent. For this reason, among its special statistical studies the Association undertook a study of the extent to which companies were utilizing their plant capacity, using a carefully selected sample of about 150 concerns. This necessarily embraced a correlative study of the effects of various types of business on the utilization of plant capacity. For example, a company that was selling large quantities of gas for domestic house heating would be under the necessity of installing sufficient plant to meet the most severe winter demands, and unless it were active in securing business such as some industrial applications of gas where the greatest demand occurs during other than the winter months, the company would find itself with a large amount of expensive plant which was used for relatively few days a year.

Control of Production.

At this point it might be advisable to consider somewhat the function of gas industry statistics in relation to the control of production. In most industries it might be said that a function of industry statistics was to assist in effecting a balance between production and consumption, between supply and demand. The events of recent years have made more familiar the phenomenon of over-production, or, as the newer economists might say, under-consumption, the supply of goods piling up with disastrous effects on prices. Obviously, in the gas industry the situation is radically different, for it is literally true here that supply and demand are one and the same. While it is true that gas is stored in holders to a certain extent, this represents at most but a few hours' supply, the main function of such holders being to smooth out irregular loads on the productive apparatus. At any given moment it is the customer's demand which brings forth almost simultaneously a corresponding supply, for it is part of the utility's franchise obligation to meet such demands instantly up to the very limit of its physical capacity.

While such differences are inherent in the nature of the utility business it by no means follows that there is no scope for the statistical control of production. In fact, if the definition of production be made sufficiently broad to cover not only the actual commodity but also the extension of its use among the customers of the gas utility, it will be found that statistical control of this sort is one of the most imperative necessities confronting such utilities to-day.

The highly integrated and somewhat complicated nature of the service rendered by the gas utility has gradually tended to obscure the fact that such a concern is in reality selling two entirely separate and distinct things—a commodity and a service. And it is only statistical research of the most thorough kind which has been able to emphasize adequately this fact. To illustrate this with a concrete case, assume that a customer applies to the gas utility for service. On the average, the company will invest from $200 to $300 for each customer. Such a consumer may want the convenience of gas service and yet actually use very little gas in the course of a year. Obviously, under the old rate system of charging only for gas actually consumed, if there were enough such customers a company might eventually find that half or more of its customers were being carried at a loss, through the uneconomic extension of mains and service. In other words, in such cases it is the control over extension of service that is the really important thing rather than the control over the production of the commodity itself, since in this latter case, as has been pointed out, the utility has little, if any, direct control.

Although these problems are individual in nature and must

* From a paper before the World Power Conference in Berlin.

be solved in each instance by the local utility, they have been of the utmost concern to, and have received most careful study by, the National Association. The result has been that the more progressive gas utilities have introduced such complete systems of statistical analysis and classification of sales that in companies with as many as 800,000 or 900,000 customers, it is possible to derive each month what amounts to a frequency distribution of sales, showing for all of these 900,000 customers just how many fall within specified sales limits and what percentage of the total sales is represented by each of the groups. With such data at hand a company is in a position to exercise rational and effective control, if not directly over the production of the commodity, at least over the extension or production of the service.

The foregoing may serve to illustrate one of the major objectives of the statistical activities of the National Association—namely, the development and utilization of statistics and statistical methods by the gas companies themselves. In the furtherance of this aim there was published a bulletin outlining the application to a typical gas utility of the more commonly used statistical methods, such as the computation of trends and the considerations governing the projection of such trends into the future. The bulletin included studies of seasonal variation as well as a comparison of the cyclical fluctuations in this company's sales with the changes in general business conditions in its territory, and an outline of the manner in which statistical normals, formulated by combining the measurements of secular trend and seasonal variations, could be used for executive appraisal of current operating performance. It showed, also, how such statistical normals could be projected into the future to afford an accurate check upon the accuracy and reliability of budget estimates.

How the American Gas Industry Stands To-day*

By J. W. West, Jr., C. W. Berghorn, G. M. Karshner, and J. P. Leinroth.

Any effort to evaluate the future progress of the American Gas Industry in the sale of its product must include some study of its past history, its present status, and the factors which explain that status.

Although James Sharp, of Northampton, England, demonstrated the possibility of using gas for cooking in his home in 1830, about fourteen years after the first commercial gas company was started in Baltimore, it was not until the year 1859 that gas was used to any extent for cooking in the United States. From then until the turn of the twentieth century the use of gas for illuminating purposes grew rapidly, but its use for cooking purposes showed a very slow rate of increase.

The first electric central station was built in 1882, but the gas industry continued to dominate the lighting business until about 1895. At that time the total output of the American gas industry was sixty-five thousand million cubic feet. Simultaneously with the introduction of electric lighting, practical gas cooking appliances were brought out, and the domestic cooking field developed so rapidly that the industry replaced the lost lighting load with the cooking load, not only much larger in volume, but also much better in load factor.

As a result of these conditions, with the exception of two years, the output of the industry has always shown an increase, although it is probable that no industry in the history of American business has ever been dealt such a severe economic blow as that which the gas industry suffered at the time its lighting load was lost to electricity. During the period since 1900 the proportion of output used for illuminating purposes has fallen from almost 100 p.ct. to an inconsequently low figure to-day. Co-incidental with the development of the gas range has come the invention and perfection of many other domestic appliances, such as space heaters, laundry equipment incinerators, refrigerators, and house heating equipment, which have broadened the uses of gas in the home to a very marked degree. It is noteworthy, however, that in 1920 the use of gas for illuminating purposes still represented about one quarter of the total sales of the industry.

These changes in the markets for gas have inevitably resulted in revolutionizing the sales methods employed by the industry. At the outset, and for many years thereafter, its sales appeal was confined entirely to illuminating purposes. Once the industry established itself in the various sections of the country, the superiority of gas over other illuminants resulted in a very rapid increase in sales. Painstaking research was inaugurated in the subject of illumination by gas, and the sales personnel and methods of the companies were naturally predicated entirely along these lines.

With the subsequent growth in the domestic heating field, however, a complete revolution in the sales activities of the companies took place. These newer uses of gas enjoyed no such monopolistic characteristics as those which favoured the industry when it acted solely as a purveyor of illuminants. As a consequence, the sales activities of the industry have taken on more and more the aspect of those employed by other industries operating in a highly competitive market.

Advertising.

The majority of the gas companies are utilizing comprehensive advertising programmes in telling the story of gas service to the public in communities served by them. Larger and better trained sales forces are being employed. A great deal of study is being devoted to the forms of salesmen's compensation which will bring about the sale of the load-building appliances. Because the primary business of the industry is the sale of gas, efforts are being made to enlist the co-operative sales activities of independent retail dealers so that a larger number of appliances may be displayed and sold by these parties. In general, the sales methods of the industry do not differ greatly from those of any other business whose product is used in the home and industry.

It is especially to be noted that all of the classes of business which have been added since the abandonment of the lighting load have tended to improve the annual load factors of the gas companies. Domestic cooking with a load factor of about 74 p.ct. was markedly superior to the 49 p.ct. load factor of lighting. Water heating ranges at about 57 p.ct., but because it has a greater diversity than cooking and in view of its greater use in the summer time, it has comprised a valuable addition to the business both from the standpoint of volume and effect on the load curve.

Tremendous consumptions of gas by the hotel and restaurant business have been built up during the past twenty years. This usage offers the best load factor of any of the classes served, averaging about 84 p.ct.

In the year 1917 the first commercial house heating job was made in a real estate development of one hundred homes near Johns Hopkins University, Baltimore, Maryland. Since that date the number of house heating installations served by the manufactured gas industry has grown so rapidly that over 17 thousand million cubic feet were consumed for this purpose in 1928. Although this consumption does not afford such a desirable load factor as the other newer uses, close examnination and intensive rate analyses have proved the possibility of serving these customers at a substantial profit.

The rapid increase in the production of gas used for house heating during the severe winter months has led to aggressive promotional campaigns for the other uses of gas—such as refrigeration and summer industrial loads—to counterbalance the winter house-heating peak.

That this broadening of the gas industry's service in the home found a ready appeal is indicated by the growth of sales both on a total and on a per customer basis. In 1901, for instance, the total annual sales of gas were one hundred and two thousand million cubic feet, and the total number of customers was four million two hundred thousand, representing an annual usage of twenty-four thousand cubic feet per customer. In 1928 the total sales were four hundred and ninety-five thousand million cubic feet, with a total of eleven million eight hundred thousand customers, representing an average annual consumption of about forty-two thousand cubic feet per customer. A large part of this increase is explained by the growth in sale of gas for industrial purposes.

The year 1905 marked the beginning of the era of industrial gas development. At that time the total sales of manufactured gas in the United States amounted to about 120 thousand million cubic feet. To-day the sales for industrial uses alone amount to 147 thousand million cubic feet. There is scarcely an industry which in some stage of its manufacturing processes does not require heat.

The gas industry is essentially a purveyor of heat in its most convenient, clean, and controllable form, and the future markets for its product, therefore, are unlimited as compared with present sales.

The gas industry has long realized that its responsibility does not end with the delivery of the fuel to its customer's premises. The greater responsibility is in knowing that the fuel is being utilized in the most efficient manner. Accepting this responsibility, the industry is creating a vast store of technical knowledge through research and experiment, and through carefully planned educational methods is developing the personnel fitted to apply this knowledge to the heat requirements of all manufacturing businesses.

The latest hotel broiler, brass melter, and improvements in conveyor bake ovens are some tangible results of these efforts,

* From a paper before the World Power Conference, Berlin, 1930.

and many more are promised in other researches now begun. These developments will profoundly affect important industries in this country to their benefit and to that of the gas industry.

SCHOOLING THE PERSONNEL.

To increase more rapidly industrial sales, the gas industry is making the best use of recognized and modern sales methods in its use of national advertising in establishing and maintaining relationship and contact with industries and in the intensive schooling of sales personnel.

Although the manufactured gas industry now has aggregate of 12 million customers, there is still room for the physical extension of gas service into towns and communities which do not now enjoy these benefits. Except in the natural gas fields there is little gas service in the rural districts and not much in communities of less than 5000 population. One survey covering nearly eight million homes in 2228 communities shows that, while 75 p.ct. of all families living in places with a population between 5000 and 100,000 and over have gas service, the percentage for communities under 5000 is only 54.

At the present time the manufactured gas industry is serving a population of about 56 million, while natural gas service is available to approximately 17 million, giving a total population of 73 million living in communities where gas service is available. This compares with the total United States population of 120 million. Research in the possibilities of transmitting gas over considerable distances has brought about a substantial growth in this practice recently. It is confidently expected that the industry will gain a substantial increase in customers from the spread of this practice in the future.

It might seem from the above indications of the gratifying growth of the industry that the future possibilities have already been approached, but only a short inspection is necessary to prove that this is contrary to the fact.

Wherever gas is available it is used in the majority of homes for cooking, but only one-third of the industry's 12 million customers employ gas water-heaters, and probably not over 5 p.ct. of these are of the automatic variety which contribute so largely to the sales of the industry. Gas-fired house heating installations are used by less than 1 p.ct. of present manufactured gas customers. That there is a large unsold field in house heating is indicated by the fact that several companies have already succeeded in gaining 2 p.ct. of their customers as house heating users.

The use of gas for refrigerating purposes in the home has grown at an amazing rate during the short time that it has been available, there being about 75,000 such units in operation to-day.

In the light of the new rôle of the industry as a purveyor of heat energy requirements in the home, commerce, and industry, probably the best method of determining the potential market would be to ascertain what proportion of the total heat requirements of the country are now supplied by the industry and estimate what proportion could reasonably be supplied in the future.

Such an estimate indicates that the theoretical potential market for gas, assuming that it can entirely replace other fuels, is so large as to be meaningless. It is sufficient to say that the manufactured gas industry is supplying only about 2 p.ct. of the heating requirements of the country to-day. If we examine the matter in more detail, however, with the purpose of determining what proportion of the market could be served by gas with reason and economy the picture becomes more significant.

Careful estimates indicate that 20 p.ct. of bituminous coal now used could be replaced by manufactured gas. The chief items in this 20 p.ct. of present bituminous consumption would be as follows—one-half of the bituminous coal now used for domestic purposes; one-half of that used for industrial purposes, including the iron and steel industries; all bituminous coal used in railroad shops; and one-quarter of the remaining railroad consumption, omitting that for locomotive firing.

To this replacement of bituminous coal is added enough gas to replace 75 p.ct. of the anthracite coal now used for domestic and industrial purposes, and 75 p.ct. of the oil now used for house heating and industrial heat treating. It is further estimated that eventually a large portion of the natural gas sold will be replaced by manufactured gas as the natural gas fields become depleted. Putting all of these replacements together gives a market for gas approximately sixteen times greater than the present output, a figure that is entirely within the realms of future possibility.

If we narrow the horizon of these estimates more strictly to the domestic field a similar calculation gives a potential market for domestic consumption alone of three times the present total output of the industry for all purposes, not considering the possibility of adding many new customers through extension of area served.

Croydon and East Surrey Gas Order.

(*Concluded from p.* 316.)

Thursday, July 31.

THE OPPOSITION ARGUMENTS.

Mr. H. ROYSTON ASKEW did not call evidence on behalf of the Croydon Corporation and the five Urban District Councils he represented, but contented himself with a statement of the reasons for their objections. These local authorities, he said, represented practically the whole of the consumers within the existing limits of supply of the Croydon Company. Amalgamations of this type were naturally promoted primarily in the interests of the gas companies concerned, but they must of necessity affect the consumers. One salient fact which stood out in this particular case was that the costs of manufacture and supply of gas in the East Surrey Company's area were considerably greater than those in the Croydon Company's area, and it must follow that unless a sufficient differential price were fixed as between the two areas the Croydon consumers would be injured as the result of the amalgamation. It appeared that the East Surrey consumers would get in the immediate future a reduction of practically a halfpenny per therm in the price of gas, and they would also reap the benefits of control by the larger Company and the benefits of its organization. On the other hand, the consumers in the districts he represented outnumbered those in the East Surrey area in the proportion of 6 to 1, and they were at least of equal importance, but they were to reap no such advantages; they were merely offered the possibilities of advantages in the future if the amalgamation proved successful, and if certain economies were effected. He was not opposing amalgamations in general, or this particular amalgamation, as such, but his clients naturally desired that fairness and justice should be done to the various interests concerned.

In regard to the proposed differential of 3d. per therm as between the price of gas in the Croydon area and the East Surrey area after the amalgamation, he had been taken aback by Mr. Cash's evidence, because, although Mr. Cash had been concerned to justify the differential of 3d., the figures put forward had shown that in fact 3d. was not enough by a considerable amount to meet the differences in costs in the immediate future. The working costs in the Croydon and the East Surrey areas respectively were shown to be 6·35d. and 9·35d. per therm, and those figures were put forward to justify the differential of 3d. Consideration must also be given, however, to capital charges, which amounted to 1·95d. in Croydon and 3·25d. per therm in East Surrey, when spread over the respective outputs; thus there was a further difference of 1·3d. which should be added to the 3d., so that the difference in total costs as between the two areas was 4·3d. An adjustment could be made to take account of the immediate savings in fees and salaries as the result of the amalgamation, which would reduce the figure of 4·3d. to something of the order of 4·1d. or 4·2d. per therm, which appeared to be the proper differential.

As to future economies, it had been suggested that it would be cheaper to replace by coal gas some of the water gas at present supplied by the East Surrey Company, but the saving effected in that way could not be very great as expressed in a figure per therm. Again, reference had been made to the possibility of connecting the works at Waddon and at Redhill by means of a steel main, and to convey gas from Waddon to Redhill. He suggested, however, that when all the costs were considered, including an allowance for depreciation of the main and amortization of the East Surrey Company's works in so far as they were rendered useless by reason of the existence of the connecting main, it would not appear that any substantial saving would be likely to be effected by this means for some years. He also contended that any savings effected as the result of the amalgamation should be spread over the whole amalgamated undertaking, and should not form an item in the differential price as between the two areas as they exist at present. He had understood Mr. Cash to say that the difference between the costs of supplying in the two areas would not be less than 3d. per therm for a period of (say) five years, but he submitted that the minimum period for which that differential should be maintained was seven years. Therefore, he urged that if the Order were made, a differential of not less than 3d. should be fixed for a period of not less than seven years.

Mr. WROTTESLEY pointed out that about 50 p.ct. of the output of the East Surrey Company at present was sold at prices which include the addition of differentials, and in the case of that Company the average differential, spread over the Company's total make of gas, amounts to 0·56d. per therm. Thus, when this was added to the proposed differential of 3d. as between Croydon and the East Surrey areas, the difference in price between the two would be 3·56d.

Mr. ASKEW replied that even if the 0·56d. referred to were deducted from the figure of 4·3d. which he had contended was the difference between the costs of supply in the two areas, the latter figure was reduced to 3·7d., so that his argument was not affected. He also reminded Mr. Ronca that numerous precedents existed for imposing compulsory differentials on the occasions of amalgamations of gas undertakings.

Mr. RONCA pointed out that if a compulsory differential were imposed as between the Croydon and the East Surrey Company's areas,

the effect would be to increase the price in Godstone immediately by 1d. per therm, having regard to the existing differential operating in that area.

Mr. ROWAND HARKER, K.C., on behalf of the Reigate Corporation, the Reigate Rural District Council, and the Godstone Rural District Council, urged, in the first place, that the proposed amalgamation should not be allowed, but that, if it were allowed, the proposed differential charges were too high. The grounds on which he urged that the amalgamation should not be allowed were that the terms which had been agreed between the two Companies were not fair to the consumers in the areas he represented, and that the promoters had not proved that any real advantage would accrue to those consumers.

Discussing the capital of the East Surrey Company, Mr. Harker said it would appear, from figures given by Mr. Cash, that the increased capital value of the securities which the shareholders in the East Surrey Company would get, as the result of the amalgamation, as compared with the value of their existing securities, would be in the neighbourhood of £30,000. This showed that a fairly good bargain had been struck as far as the East Surrey Company's shareholders were concerned, and he urged that the capital appreciation which might accrue to the stock of the vendor companies in the case of such amalgamations was a not unimportant factor for the Board of Trade to bear in mind. He knew of no case in which, on the occasion of an amalgamation, either Parliament or the Board of Trade had ever allowed the shareholders of the vendor company an immediate increase in dividends, and it would be very dangerous to approve of that principle in this case, because in the event of such approval this case would be quoted as a precedent in future amalgamation proposals. Although the promoters held that the additional burden imposed upon the consumers in the whole of the amalgamated undertaking would be small, it might well be that the Company, if given a free hand to operate differentials of the magnitude proposed, would maintain the differentials in the outer areas in the interests of the Croydon consumers. The additional burden of the extra capital charges would represent 0·16d. per therm so far as the East Surrey area was concerned, and 0·8d. per therm in respect of Oxted.

In regard to the compensation it was proposed to pay to Directors and Officers of the absorbed companies he urged that it was too much.

Commenting on the point made by the promoters, that the effect of the amalgamation would be an immediate reduction in the price of gas in the East Surrey area by 0·4d. per therm, he said that attention should be drawn to the price at which the East Surrey Company ought to be able to sell gas to-day, and the prices at which it ought to sell gas in the future if it remained a separate entity. As to the advantages which it was claimed would accrue in the future by reason of the amalgamation, he pointed out that the Croydon Company had not given any indication of how they proposed to deal with the supply of gas in the area which they proposed to absorb, but had simply asked for a free hand in this respect.

He proposed to call evidence to show that the standard price of the East Surrey Company to-day, if it were to remain a separate entity, should be 12·8d. instead of the existing standard price of 16·8d. per therm. If it were reduced to the lower price of 12·8d., he suggested that the present selling price in the inner area of the East Surrey (12·4d.) would soon be reduced, so that the East Surrey consumers would be in a better position if the Company remained a separate entity than they would be in the event of amalgamation.

In criticizing the proposed differential of 3d. per therm as between the Croydon and East Surrey areas, he pointed out that it would probably be unnecessary for the Croydon Company to apply to the Board of Trade for further capital powers or for other powers for another six years, so that if the differential were allowed to-day, no one would have an opportunity of criticizing the exercise of these powers by the Company for six years.

In a further criticism of the amount of the differential, he said that if all the advantages foreshadowed by Mr. Cash as resulting from the amalgamation were to be realized, then the amount of the differential could not be justified. Further, there would be anomalies arising in the application of these differential prices. Under the proposals in the Order the amalgamated Company would be able to charge 6s. per 1000 c.ft. in the Oxted area, although for years the price in Oxted had been 5s. per 1000 c.ft. It would be entirely wrong to impose upon the Oxted consumers an additional charge of 1s. per 1000 c.ft.

The only witness called on behalf of the Reigate and Godstone authorities was their Consulting Engineer (Lieut.-Col. W. M. Carr, who is Engineer and General Manager to the Stretford and District Gas Board). He put forward figures to prove the contention that the standard price of the East Surrey Company at present should be 12·0d. instead of the existing 16·8d. per therm, and that the average differential charge as between the areas of the Croydon and East Surrey Companies after amalgamation should 2d. per therm.

Witness submitted a series of tables giving details of his calculations. He had examined the accounts of the East Surrey Company in 1920 (it was then called the Redhill Company), because those were the figures on which the standard price of 16·8d., fixed in 1921, was based; and he had compared them with the 1929 figures, making such adjustments in the latter as were necessary in respect of abnormalities. The total net expenditure on revenue account in 1920 was 56·74d. per 1000 c.ft., equivalent to 12·596d. per therm, the corresponding figure for 1929 being 9·778d. Thus, the net reduction in working costs was 2·8d. After making the adjustments, he arrived at a figure of 4·881d., representing the difference between the costs in 1920 and what he considered to be the present-day costs. This figure he deducted from the existing standard price of 16·8d., and so arrived at 12·0d., which, he suggested, should be the standard price.

The abnormalities in respect of which adjustments were made to the 1929 figures were in regard to the costs of coal, repairs to works, and legal charges. The reduction he made totalled 2·065d. per therm, and, deducting this from the 1929 working costs (9·778d.), he arrived at a figure of 7·715d. Adding to this the capital and loan charges, he calculated that the true costs of supply by the East Surrey Company to-day should be 10·965d. per therm—and this was the basis of Mr. Harker's claim that the Company could sell gas at 11d. The equivalent figure for the Croydon Company was 8·91d. per therm, so that the differential between the Croydon and East Surrey areas should be 2d., and not 3d., per therm.

In the course of cross-examination, Mr. Carr said he had not inspected the East Surrey Company's works, and Mr. Wrottesley seized upon this admission, and suggested that Mr. Carr was not really in a position to say whether or not the charges for works repairs in 1929 were reasonable or not if he had not seen the works. Mr. Carr said he had not been acting for the Company, and was unable, therefore, to inspect the works, but the figure for repairs of works in the 1929 accounts was higher than could be fairly charged as a perpetual charge for this item, and, therefore, he had made adjustments. It was pointed out by Mr. Wrottesley that the Company had three works, and after some questioning witness admitted that if the works were in a bad state of repair the renewals charges would be fairly high for a number of years. In the absence of definite figures of present costs to the Company, he said, it had been necessary to make estimates, based on the 1929 figures, and adjusted in accordance with his experience and knowledge.

A good deal of criticism was directed by Mr. Wrottesley to witness's figure representing coal costs per therm, and he pointed out that if in fact the Company had made a lucky coal contract last year, and the present cost to the Company was higher at present than last year, instead of lower, as estimated by Mr. Carr, the figures put forward would be vitiated. Mr. Carr agreed that that would be so, but he maintained that the 1929 figure was high.

Mr. ROYSTON ASKEW (representing the Croydon Corporation and other Local Authorities within the area of supply of the existing Croydon Company) then reverted to his previous suggestion that the differential as between the Croydon and East Surrey areas should be 3d., compulsorily for seven years. These authorities, he said, after having given consideration to the extra differentials already in operation, adhered to their suggestion that the 3d. differential between the Croydon and East Surrey areas should be compulsory for seven years, but that the extra differentials in the various parts of those areas should be permissive.

Mr. WROTTESLEY, summing up on behalf of the promoters, made a further criticism of Mr. Carr's figures on the ground of their inaccuracies. In regard to coal costs, he said that, whereas Mr. Carr's figures showed that coal costs per therm would be 0·6d. less now than in 1929, they would be increased by 0·37d., so that on that item alone there was a deficiency of 1d. in Mr. Carr's figures. The calculations, he said, were perfectly useless, and they also illustrated the danger of introducing purely extraneous considerations such as that of standard price.

Continuing, Mr. Wrottesley said that the Order as promoted had been approved by the Croydon and the East Surrey Companies, and he had no power to accept modifications. The position was that if the Board of Trade did not approve of it in the form in which it was promoted, then the parties became free agents, and would be in a position to withdraw.

In the matter of compensation for loss of office, he emphasized that Parliament had for years recognized that in the event of amalgamation the Companies concerned should not stand on their legal rights and throw their Officers on to the streets without compensation; and the Companies in this case were acting in accordance with the practice that had been followed by Parliament for years. In view of the age and qualifications of some of the Officers who would be deprived of their employment by this amalgamation, it was unlikely that they would find future employment in capacities similar to those in which they had served the East Surrey Company, more particularly having regard to the tendency to amalgamations at the present time, which resulted in a reduction of the number of posts available for men of their calibre. Therefore, he urged that amalgamations should not be discouraged by introducing the practice of compensating inadequately. In any case, who would be harmed as the result of giving just or even generous compensation to displaced Officers?

Discussing Mr. Harker's reference to capital appreciation resulting from the amalgamations, he asked whether one could conceive of any amalgamations taking place in the future if the purchasing companies reduced the dividends on the capital of the vendor companies on the ground that the value of the vendor companies' stocks would be appreciated by reason of the amalgamation, and that by selling the stock and re-investing the money received the shareholders could obtain a return similar to that which they had received previously? Mr. Harker had said he did not know of any case in which Parliament or the Board of Trade had allowed the shareholders of an amalgamated undertaking to secure an immediate increase in dividends, but the fact was that there were plenty of such cases within the last six months, and many more over a number of years. Mr. Wrottesley urged that the Board of Trade should not put any artificial barriers in the way of amalgamations in the future, for it was proved that such amalgamations were in the interests of the consumers.

The bevy of Local Authorities represented by Mr. Harker and Mr. Turner had asked the Board of Trade not to agree to an amalgamation which would give the consumers in the areas of those Local Authorities an immediate reduction of nearly a halfpenny per therm in the price of gas, and the prospect of cheaper gas in the future than they would get from the East Surrey Company if it remained a separate entity. These authorities had suggested that the differential between the Croydon and the East Surrey areas should be 2d. per therm, and the authorities within the Croydon area had suggested something over 4d. The Companies, however, whose duty it was to charge fairly the two classes of consumers, had suggested 3d., which represented the mean. The Croydon Company had operated differential prices for years, and had done so in such a way that it had never been challenged by anybody concerned with the interests of the consumers within the areas in which the differentials operated. This was not a bad record, and it indicated that the Company could be trusted to deal fairly with their consumers in the future.

The inquiry then concluded.

PARLIAMENTARY INTELLIGENCE.

[From Our Special Correspondents.]

House of Lords.

Private Bills.

The South Yorkshire and Derbyshire Gas Bill, the Ascot District Gas and Electricity, the Brixham Gas and Electricity, and the Hartlepool Gas and Water Bills received the Royal Assent on Friday, Aug. 1, 1930.

Special Orders.

The following Special Orders, having been passed by the Special Orders Committee, have now been approved by the House: Tottenham and District Gas Order, 1930; Wolverhampton Gas Order, 1930; Bedford District Gas Order, 1930; Uxbridge Gas Order, 1930; Workington Gas Order, 1930; and Watford and St. Albans Gas Order, 1930.

House of Commons.

Special Orders.

Special Orders made on the application of the Tottenham and District Gas Company, the Wolverhampton Gas Company, the Bedford District Gas Company, the Uxbridge, Maidenhead, Wycombe, and District Gas Company, the Watford and St. Albans Gas Company, and also a Special Order presented on the application of the Mayor, Aldermen, and Burgesses of the Borough of Workington, have been approved.

Gas Mantle Contract, Calcutta Corporation.

Mr. RAMSBOTHAM asked the Secretary to the Overseas Trade Department the terms under which the Calcutta Corporation decided to give the whole of its contract for gas mantles to Germany, seeing that the larger part of the contract for such mantles had been given to British firms for many years.

Mr. GILLETT replied that His Majesty's Senior Trade Commissioner, in reporting the fact that no part of the contract was awarded to firms in this country, did not report the terms upon which the contract was placed.

Co-Ordination of Road Work.

Mr. D. G. SOMERVILLE asked the Minister of Transport whether within the last six months there had been any cases in London where the surface of any leading thoroughfare had been taken up for the purposes of electric light, gas, water, or Post Office mains, and had been replaced and taken up soon after for surface repairs, whether he was satisfied that there was now proper co-ordination between all the authorities, local and otherwise, having the right to take up road surfaces and impede traffic; and, if not, what steps he proposed to take to effect further co-ordination.

Mr. HERBERT MORRISON replied that he had not the information necessary to enable him to reply to the first part of the question. So far as the second part was concerned, he would refer the Hon. Member to the relevant sections of the third and fourth annual reports of the London Traffic Advisory Committee. Shortly, the position was that, within the limited powers which he possessed, a considerable amount of co-ordination had been effected. From the point of view of the improvement of the conditions of traffic in London, he was of opinion that the scope of those powers ought to be extended; and that question would be considered as soon as a convenient opportunity occurred.

REGISTER OF PATENTS

Catalytic Oxidation of Toluene.—No. 331,525.

THE GAS LIGHT AND COKE COMPANY, of Westminster, S.W. 1, and ADAM, W. G., SHANNAN, W. V., and CUCKNEY, M., all of the Tar and Ammonia Products Works, Beckton, E. 6.

No. 2995; Jan. 29, 1929.

This invention relates to the catalytic oxidation of toluene, and in particular to processes of air-oxidation. An object of this invention is to provide an improved process of the type referred to, resulting in high yield and high rate of production per unit of time of the desired partial oxidation products, and enabling also the use of a relatively small amount of catalyst of long active life, and consequently catalyzing plant of small dimensions as regards size and/or number of units.

A further object is to provide an improved process, which, taking into account that the oxidation reaction is strongly exothermic, has the advantage that the reaction temperature may be readily controlled, notwithstanding the high speed of operation of the process, with the result that the proportion of complete combustion of hydrocarbon occurring is minimized and fusion of the catalyst is prevented.

The reactants contain an excess of hydrocarbon over the oxygen theoretically necessary for the formation of the desired partial oxidation products. This feature is an important factor in the attainment of high yield, and it contributes to high rate of production of partial oxidation products per unit of time.

According to a further feature of the invention, a process embodying the feature aforesaid of use of an excess of hydrocarbon, and adapted for closed system operation, is characterized by the fact that the hydrocarbon excess is provided by diluting the air which is fed into the system, with a portion of the effluent gases. The use of exit gases tends to ensure against the formation of an explosive mixture, and it enables a more delicate control to be realized of the reaction temperature in the catalytic tubes, with consequent improvement in the quality of the products obtained. By the use of water vapour as a component of the reaction gas mixture, the effective life of the catalyst may be lengthened. The catalytic material should be packed as closely as possible in the catalyst tubes, thus providing for a minimum of free gas space, while at the same time the catalytic material should not offer an unduly high resistance to the flow of the gases through the tubes.

An example of the process is described in the specification.

Lubrication of Dry Gas Meters.—No. 331,598.

SIMPSON, S., of Exmouth, and WILLEY & CO., LTD., of Exeter.

No. 11,165; April 11, 1929.

The invention has among its objects to provide simple and convenient means for the lubrication of the valves, the worm, the crank, or other moving parts of the meter mechanism. The lubrication is effected from above by the provision of a tubular fitting within the top plate of the meter casing from the inwardly extending part of which fitting distributing pipes are provided to extend outwardly and downwardly to positions immediately over the valves, the worm, the crank, or other parts of the meter mechanism. The tubular fitting is adapted for the reception of a screw-threaded plug or pin which may be inserted from the upper outer open end of the fitting and in such position therein that its removal is impossible except by means of a special tool adapted to be inserted within the upper open end of the fitting and to engage the head of the screw-threaded plug or pin for effecting its removal; the upper outer open end of the fitting is provided with a screw-threaded plug adapted for ready removal. The lower part of the tubular fitting is provided with a cavity for the reception of the lubricating oil.

Gas Ovens.—No. 331,710.

CANNON IRON FOUNDRIES, LTD., CLAYTON, R. T., and BENTON, W. E., all of Bilston.

No. 22,534; Feb. 7, 1930.

The object of this invention is to provide an improved oven which combines a high thermal efficiency with effective ventilation and freedom from condensation, and in which substantial uniformity of temperature is normally maintained throughout the oven, but which permits the oven to be divided by a removable solid shelf into regions of different temperature without risk of the hot products of combustion being deflected directly from the burners into the outlet flue.

The invention comprises an oven in which the hot products of combustion from a burner or burners in the lower part of the oven are taken out of the oven in an upward direction, through an opening or openings in a false top adjacent to its rear edge, and pass downwardly through a space between the back of the oven and a false back-plate to an outlet flue adjacent to the lower end of the back, the space between the false top and the top closure of the oven in front of the opening or openings being filled with lagging material.

It has already been proposed to construct an oven with a space between the back and a false back-plate of which the upper edge is spaced from the top of the oven to provide an opening through which the hot products of combustion enter the space behind the false back-plate and pass downwardly to an outlet flue near the lower end of the back, but such an arrangement, state the patentees, is distinct from that of the present invention in which the hot gases leave the body of the oven in an upward direction through an opening at the rear edge of a false top.

C.W.G. Manufacture.—No. 331,756.

HUMPHREYS & GLASGOW, LTD., of Victoria Street, Westminster. (Assignees of H. G. TERZIAN, of Philadelphia).

No. 27,497; Sept. 10, 1929. Convention date, Jan. 3, 1929.

The following claim is put forward for this invention:

The process of making mixed "reformed" oil gas and water gas which includes the following steps: Air blasting an ignited fuel bed and burning the air blast gases in their passage through and out of a carburettor and superheater to heat the same; passing oil through carburettor and superheater in the same direction as the direction

of passage of the air blast gases, and then through the fuel bed to vaporize the oil and crack the vapours and reform the gas with deposition of carbon in the fuel bed; and steaming the fuel bed to make water gas and to remove the deposited carbon.

The specification is illustrated by one diagram.

Dust Remover for Water Gas Sets. No. 331,755.

HUMPHREYS & GLASGOW, LTD., of Victoria Street, Westminster (Assignees of E. J. BRADY, of Philadelphia).

No. 27,495; Sept. 10, 1929. Convention date, Oct. 26, 1928.

Fig. 1 shows a plan of the apparatus in connection with a carburetted water gas set; fig. 2 shows an elevation of the apparatus itself; fig. 3 shows a horizontal section along the line 3—3 in fig. 2; and fig. 4 shows a horizontal section along the line 4—4 in fig. 2.

Referring to figs. 2 and 4, 1 indicates the chamber of the apparatus, which is in the form of an upright frustum of a cone and is provided with the hopper bottom 2 which has the closable opening 3. In the arrangement shown the chamber is provided within the shell 4, with the refractory lining 5, and the heat insulating material 8. When handling gases of low or moderate temperature this lining may be dispensed with. The gas inlet 6 enters the chamber tangentially and downwardly as shown. This inlet may be constricted as shown in fig. 3 if a higher inlet velocity is desirable than would be obtained from an unrestricted inlet. 7 is the gas outlet which leads tangentially from the chamber at a higher elevation than the inlet 6.

Fig. 1.

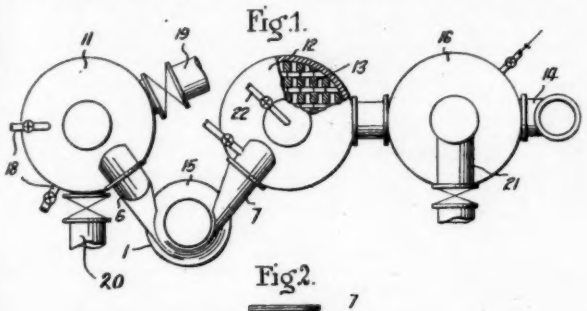


Fig. 2.

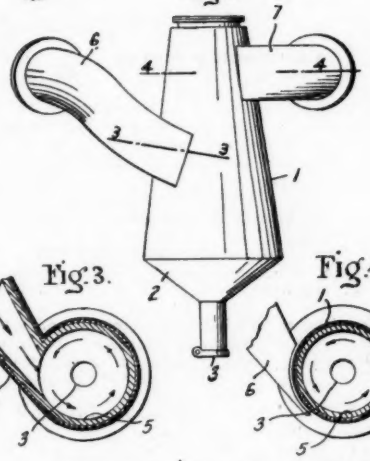


Fig. 3.

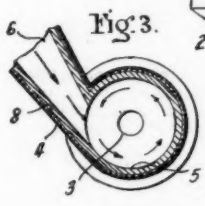
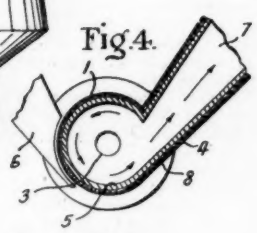


Fig. 4.



Humphreys & Glasgow Dust Remover.

In operation the gas laden with solid particles enters the chamber through the inlet 6 and is swirled downwardly within the chamber. The solid particles are driven by centrifugal force to the outside of the swirling gas stream and are thrown against the sloping wall of the chamber. Due to the downward incidence of their contact with the wall and the slope of the wall, the rebound of the particles is directed downward toward the base of the chamber, where, assisted by gravity, the particles settle. The height of the gas entrance above the base is chosen such that the gas swirl will not be carried down far enough to pick up the solid particles which have settled out.

The swirling gas after the initial downward swirl which takes place immediately after its entrance, swirls upwards through the chamber and finds an easy and rapid exit through the tangential gas outlet, which leads off in the direction of the swirl. With the tangential outlet the back-pressure developed in the apparatus is much lower than if an axial outlet were provided. The separation caused by the combination of the downward tangential inlet and the sloping wall of the chamber, with the outlet above the inlet, is so effective that the gases may leave tangentially through the outlet at a considerable velocity without carrying dust out of the apparatus.

The angle between the inlet and the outlet as seen in plan may be widely varied to suit the arrangement of the apparatus to which the separator is connected.

Referring to fig. 1, which shows a plan view of a carburetted water gas set with the separator connected between the generator and the carburettor, 11 is the generator, 12 the carburettor, 16 the superheater (the two latter vessels are filled with checkerbrick as indicated at 13), 14 the stack, 15 the separator provided with the inlet 6 leading from the top of the generator and the outlet 7 leading to the top of the carburettor, 18 are steam supplies to the generator, 19 is the blast supply, 20 is a combustible gas offtake from the generator leading to the washbox (not shown) as does the combustible gas offtake 21 from the superheater 16. 22 is the oil supply to the carburettor.

In operation the generator is blasted, the hot blast gases heavily laden with particles of fuel and ash pass into the separator 15 through connection 6. The blown over fuel and ash particles are deposited in the separator and the cleaned gas passes through the connection 7 to the carburettor 12 and superheater 13 and thence to the stack 14. Secondary air is admitted to the carburettor. The run is now made and steam is passed up through the fuel, producing water gas which also passes through connection 6 into the separator 15 before its entrance to the carburettor. Solid particles carried out of the generator are deposited in the separator.

Prepayment Meters.—No. 331,914.

SIMPSON, S., of Exmouth, and WILLEY & CO., LTD., of Exeter.

No. 11,164; April 11, 1929.

The following claims are made for this invention, which is a modification of Patent No. 292,705—see "JOURNAL," Vol. 183, p. 317:

1. A modification of Patent 292,705, whereby the return movement of the coin holder after the introduction of the coin into the holder and after the commencement of its movement for setting the mechanism afresh is prevented by the engagement of a pawl lever with the containing casing, which pawl lever is carried by the member of the coin holder which moves diametrically upon the introduction of a coin into the coin chamber.

2. Coin freed mechanism as set forth in claim 1, wherein the pawl lever serves as an anchorage for the spring by which the slidable member of the coin holder is returned to the initial position in the absence of a coin from the coin chamber.

Coin freed mechanism for gas and as set forth in claim 2, wherein the pawl lever engages with a series of ridges or recesses formed in the wall of the containing casing when a coin is introduced into the coin chamber.

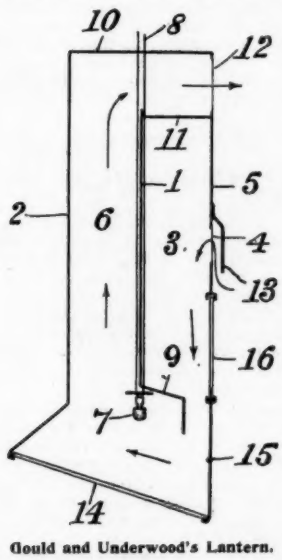
Gas Lamps.—No. 332,080.

GOULD, F. J., and UNDERWOOD, A. J., both of 25, Grosvenor Place, S.W. 1.

No. 24,022; Aug. 6, 1929.

A preferred form of lantern, according to this invention, is illustrated by way of example in the accompanying drawing, the view being a somewhat diagrammatic end section.

In this example a medium partition 1 divides the lantern 2 into a down-passage 3 for air entering by way of an inlet 4 in the back 5 and an up-passage 6 for the air and products of combustion from burners 7 supplied with gas through a tube 8 which may be suitably



Gould and Underwood's Lantern.

provided with a control cock (not shown). The air is prevented from reaching the burners directly and is made to pass along the bottom of the lantern by a baffle 9 located immediately above the burners, and after reaching the top of the up-passage the air is directed horizontally by the top 10 of the lantern and a horizontal partition 11 which also closes the upper end of the down-passage; and the air discharges through an outlet 12 provided above the inlet in the back 5. The inlet has a weather plate and baffle 13 and the outlet is preferably provided with a like member. The glazed bottom 14 is carried by a frame hinged at 15 to the back, and the latter is provided with an advertisement panel 16. It will be observed that by arranging the inlet 4 at about the middle of the lantern and the outlet 12 at the top thereof, the likelihood of burnt gases entering the passage 3 is greatly reduced.

A reflector may be suitably positioned in the lantern.

GAS MARKETS & MANUFACTURES

Stock Market Report.

[For Stock and Share List, see later page.]

With the holiday season is full swing it is not anticipated that any marked expansion in business will be noticeable for the next week or so, and when the long Account closed on Friday last conditions in most markets were dull. Gilt-edged securities and high-class investment stocks were still strongly supported, however, and prices of several commodities in these sections showed fractional increases on the week.

Gas Stocks and Shares were by no means neglected, and any stock coming into the market was speedily absorbed. Gas Light £1 units were in demand, and the price rose 3d. to 19s. 3d. The yield at this price is £5 16s. 4d. p.ct., even if the dividend for the year is no more than maintained at £5 12s. It is interesting to note that these units have now been introduced to the New York Kerb market. The Company's 4 p.ct. preference stock also advanced by 1 point to 78½.

The Newcastle and Gateshead Company's consolidated stock, which has been rather undervalued for some time past, recorded an increase at the local Exchange of 6d. per £1 unit to 16s. 4½d. The Company distributed 5 p.ct. from 1923 to 1927, in 1928 5⅞, and last year £5 7s. 6d. The yield at the latter rate is £6 11s. 3d., so that for the high-class security offered some further appreciation in value is justified. Northampton 5 p.ct. maximum recorded a sharp rise of 4 points to 80½, and South Metropolitan 6 p.ct. preference gained 1 point to 110½. Business in the latter Company's recent 5 p.ct. debenture issue is now being done at 2½ premium. Among debentures, Wandsworth 5 p.ct. gained 2 points to 96½, and Primitiva 4 p.ct. consolidated 1 point to 82½. On the other hand, European and Imperial Continental ordinary stocks each dropped 5 points to 110 and 360 respectively.

The accounts of the Maidstone Gas Company for the year ended June 30 show very satisfactory progress. The balance of the revenue account is £20,914 (against £16,990), which, together with a balance of £12,533 brought forward and £231 interest on investments, makes a total of £33,678. After providing for interest on debenture stock and deposits, income-tax, £2250 transferred to reserve fund (against *nil*), and the interim dividend of 4 p.ct., there remains a balance of £18,497, out of which the Directors recommend a final dividend of 4½ p.ct., making 8½ p.ct. for the year. Other dividend announcements are: Derby Gas Company, an interim dividend of 3½ p.ct. on the consolidated stock (same), and Portsmouth Gas Company, interim dividends of 4 p.ct. and 2½ p.ct. on the consolidated and maximum stocks respectively (same).

Coal Markets.

There is no change in the situation, and depression continues in all markets. Nearly everywhere, pits were laid off for several days at the holiday week-end, but it made no appreciable difference to the position, so scarce is prompt trade. No improvement is looked for this month. On the other hand, there are indications of some sort of prospects for next year. According to observers, for instance, of the Newcastle market, there are buyers who would pay up to sixpence above current rates for contracts over 1931. Until more is known of the marketing schemes, collieries and exporters are not being attracted by such prospects.

Current quotations for Durham gas coals are little altered. Wear specials ask 15s. to 15s. 3d. f.o.b., and best qualities 14s. 9d. to 15s. Seconds are easy at 12s. 6d. to 13s. 3d. The best coking makes have difficulty in getting 13s.

The brightest feature all round is gas coke. In many parts, outputs are fully booked for several weeks ahead, and the price remains steady at 21s. 6d., with reasonable prospects of an advance on this later.

Contracts Advertised To-Day.

Gas Oil.

The Sidmouth Urban District Council invite tenders for the supply of gas oil. [Advert. on p. 362.]

General Stores.

The Gas Committee of the City of Bradford invite tenders for general stores. [Advert. on p. 362.]

Pipes, &c.

The Gas Committee of the City of Bradford invite tenders for wrought and cast iron pipes and specials. [Advert. on p. 362.]

Current Sales of Gas Products.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Aug.* 11.

The values of tar products remain unaltered and are as follows: Pitch is 47s. 6d. per ton f.o.b.

Creosote for export remains at 6d. to 6¼d. per gallon f.o.b.

Pure toluole is 2s. 2d. to 2s. 3d. per gallon; 95/160 solvent naphtha, 1s. 5d. to 1s. 6d. per gallon; pure benzole, 1s. 10d. to 1s. 11d. per gallon.

Pyridine bases are about 3s. 9d. per gallon. All these prices are *ex* sellers' works.

Tar Products in the Provinces.

Aug. 11.

The average prices of gas-works products during the week were: Gas-works tar, 20s. to 24s. Pitch—East Coast, 46s. f.o.b. West Coast, Manchester, Liverpool, Clyde, 46s. f.o.b.* Toluole, naked, North, 1s. 7½d. to 1s. 8¼d. Coal-tar crude naphtha, in bulk, North, 9d. to 10d. Solvent naphtha, naked, North, 1s. 3d. to 1s. 3½d. Heavy naphtha, North, 1s. to 1s. 0½d. Creosote, in bulk, North, liquid and salty, 3½d. to 3⅝d.; low gravity, 1½d.; Scotland, 3½d. to 3⅝d. Heavy oils, in bulk, North, 5½d. to 6d. Carbolic acid, 60's, 2s. to 2s. 1d. July/December. Naphthalene, £10 to £12. Salts, £3 to £5, bags included. Anthracene, "A" quality, 2½d. per minimum, 40 p.ct., purely nominal; "B" quality, unsaleable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port, it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *Aug.* 9.

Quotations for most products remain unchanged. More interest is being taken in cresylic acid at the low prices now ruling.

Pitch.—Very few orders have been placed, and value is nominal at 45s. to 47s. 6d. per ton f.o.b. Glasgow. Home orders command about 45s. per ton *ex* works.

Refined tar to Ministry of Transport Specification continues rather quiet with value easy at 3¼d. to 3¾d. per gallon f.o.r. makers' works in buyers' packages.

Creosote.—All grades are steady, but business is spasmodic. B.E.S.A. Specification is 3¼d. to 3¾d. per gallon; low gravity, 3d. to 3¼d. per gallon; and neutral oil, 3d. to 3¼d. per gallon—all free on rails in bulk.

Cresylic.—Makers' quotations have been reduced and a few orders have been placed during the week. Pale 97/99 p.ct. is 1s. 7d. to 1s. 8d. per gallon; dark 97/99 p.ct. is 1s. 6d. to 1s. 7d. per gallon; and pale 99/100 p.ct. is 1s. 9d. to 1s. 10d. per gallon—all *ex* works in bulk.

Crude naphtha is quieter, but meantime value remains at 4¼d. to 4⅜d. per gallon f.o.r. makers' works in bulk.

Solvent naphtha.—90/160 grade is 1s. 2½d. to 1s. 3½d. per gallon, and 90/190, 1s. to 1s. 1d. per gallon, both f.o.r.

Motor benzole continues quiet at about 1s. 5¾d. to 1s. 6¼d. per gallon.

Pyridines are unchanged. 90/160 is about 3s. to 3s. 3d. per gallon.

The following are considered to be the market prices at the present time:

	s. d.	s. d.	
Crude benzole . . .	0 10	to 0 11	per gallon at works
Motor ,, . . .	1 5½	,, 1 6½	,, ,,
Pure ,, . . .	1 10	,, 1 11	,, ,, ,,

Overseas Opportunities.

[Extracted from the Board of Trade Journal.]

South Africa.

Cast-Iron Pipes, Valves, and Specials.—H.M. Senior Trade Commissioner in South Africa reports that the Paarl Municipality are calling for tenders for approximately 10,000 ft. of 6-in. cast-iron pipes, valves, and specials. Tenders have to be presented in South Africa by Aug. 23. Firms desirous of offering cast-iron pipes, &c., of British manufacture can obtain further particulars of this call for tenders upon application to the Department of Overseas Trade, 35, Old Queen Street, S.W. 1. (Ref. A.X. 10,000.)

STOCK AND SHARE LIST.

[For Stock Market Report, see earlier pages.]

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. Aug. 8.	Rise or Fall on Week.	Transact'ns Lowest and Highest Prices During the Week.
£			% p.a.	% p.a.				
171,978	Stk.	Feb. 6	5	5	Aldershot 5 p.c. max. C. .	73—78	..	..
522,992	,,	,,	4	4	Do. 4 p.c. Pref. . .	70—73	..	..
1,551,868	,,	Apl. 3	7⅞	7⅞	Alliance & Dublin Ord. . .	92—95	..	94
374,000	,,	July 10	4	4	Do. 4 p.c. Deb. . . .	60—63	..	..
522,655	,,	Mar. 6	7	7	Barnet Ord. 7 p.c.	109—112	..	..
300,000	1	Apl. 24	1/4⅛	1/7⅞	Bombay, Ltd.	16/- 18/-	..	16/—17/-
174,500	10	Mar. 6	9	9	Bournemouth 5 p.c. . . .	14—15	..	..
500,050	10	,,	7	7	Do. 5 7 p.c. . .	12½—12⅝	..	12½—12⅝
439,160	10	,,	6	6	Do. Pref. 6 p.c. .	10½—11½	..	11⅞
50,000	Stk.	June 26	3	3	Do. 3 p.c. Deb. .	54—57	..	..
162,025	,,	,,	4	4	Do. 4 p.c Deb. .	72—75	..	..
357,900	,,	Mar. 20	7½	7½	Brighton & Hove 6 p.c. Con.	115 -120	..	119½
371,880	,,	,,	6½	6½	Do. 5 p.c. Con.	103—105	..	..
1,287,500	,,	July 24	5	5	Bristol 5 p.c. max.	88—89a*	..	..
855,000	,,	Apl. 3	7	8	British Ord.	110—115	..	..
100,000	,,	June 26	7	7	Do. 7 p.c. Pref.	112—117	..	..
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. . .	70—73	..	..
450 000	,,	,,	5	5	Do. 5 p.c. Red. Deb. . .	90—93	..	..
100,000	,,	June 26	5	5	Cambridge 5 p.c. Deb. . .	93—96	..	..
100,000	10	May 22	6	10	Cape Town, Ltd	9—10	..	..
100,000	10	Apl. 24	4½	4½	Do. 4½ p.c. Pref. . .	6½—7½	..	..
150,000	Stk.	June 26	4½	4½	Do. 4½ p.c. Deb. . .	19—74	..	..
626,860	,,	July 24	6	6	Cardiff Con. Ord.	94—97*	..	..
287,860	,,	June 26	7½	7½	Do. 7½ p.c. Red. Deb. .	97—100	..	..
157,150	,,	Feb. 20	5	6½	Chester 5 p.c. Ord.	88—93b	..	..
98 936	1	May 8	†2/-	†2/-	Colombo, Ltd. Ord. . . .	33/—35/-	..	..
24.500	1	,,	1/4½	1/4½	Do. 7 p.c. Pref. .	18/6—20/6	..	..
375,402	1	Apl. 3	1/9⅜	1/9⅜	Colonial Gas Assn. Ld. Ord	17/—19/-	..	..
187,848	1	,,	1/7½	1/7½	Do. 8 p.c. Pref.	19/—21/-	..	..
2,073,280	Stk.	July 24	7	6	Commercial Ord.	93—96*	..	94½—95½
475,000	,,	June 26	3	3	Do. 3 p.c. Deb. . .	56—59	..	..
787,560	,,	Feb. 20	7	7	Croydon sliding scale . .	105—108	..	..
453,100	,,	,,	5	5	Do. max. div. . . .	83—86	..	..
542,270	,,	Mar. 6	7	10	Derby Con.	115 -125e	..	..
55,000	,,	June 26	4	4	Do. Deb.	65—70e	..	..
209 000	,,	Mar. 6	5	5	East Hull Ord. 5 p.c. . .	71—73	..	..
1,002,180	,,	Mar. 20	†4g	†7g	European, Ltd.	105—115	—5	107 -110½
18,629,125	,,	July 24	5⅝	5⅝	Gas Light & Coke 4 p.c. Ord.	19/—19/6f*	+-/3	19/—19/6
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max. . . .	62—64*	..	63 64
4,157,020	,,	,,	4	4	Do. 4 p.c. Con. Pref. . .	77—80*	+1	77½—79
5,602,620	,,	June 26	3	3	Do. 3 p.c. Con. Deb. . .	58—61	..	59½ -60½
3,542,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. . .	97—100	..	100
161,480	,,	Feb. 20	10	10	Harrogate Cons. 10 p.c. max.	158—163	..	..
82,500	,,	Mar. 20	7	7	Hastings & St. L. 5 p.c. Conv.	99—104	..	..
258,740	,,	,,	5½	5½	Do. 5½p.c. Conv.	78—83	..	..
70,000	10	May 22	†10	‖	Hongkong & China, Ltd. .	13½—14½	..	..
213,200	Stk.	Mar. 6	6	6	Hornsey Con. 5½ p.c. . . .	90—98	..	..
2,436,594	,,	May 22	10	25	Imperial Continental Cap. .	350—370	—5	352—360
223,180	,,	Feb. 6	3½	3½	Do. 3½ p.c. Red. Deb.	80—85	..	..
285,242	,,	Mar. 20	8½	8½	Lea Bridge 5 p.c. Ord. . .	123—128	..	..
2,145,907	,,	Feb. 20	6	6	Liverpool 5 p.c. Ord. . . .	93—94b	..	..
600,000	,,	Mar. 20	7	7	Do. 7 p.c. Red. Pref..	100—102b	..	..
165,736	,,	Feb. 20	9	8	Maidstone 5 p.c. Cap. . .	119—124	..	..
69,480	,,	June 26	3	3	Do. 3 p.c. Deb. . .	51—54	..	..
75,000	5	June 26	†10	†10	Malta & Mediterranean . .	5½—6	..	..
					Metrop'itan (of Melbourne)			
392,000	—	Apl. 1	5½	5½	5½ p.c. Red. Deb. . . .	90—93	..	..
541,920	Stk.	May 22	†6	†8	Montevideo, Ltd.	105—110	..	107½—109½
2,061,315	,,	July 24	5½	5	Newcastle & Gateshead Con.	16/—16/9d/	+-/6	..
682,856	,,	,,	4	4	Do. 4 p.c. Pref. .	70½—71½d*	.	..
691,705	,,	June 26	3½	3½	Do. 3½ p.c. Deb. .	66½—67½d	..	..
169,940	,,	Mar. 6	7½	7½	North Middlesex 6 p.c. Con.	109—114	..	..
396,160	,,	Feb. 6	5	5	Northampton 5 p.c. max. .	78—83	+4	81
300,000	,,	Apl. 24	9	7	Oriental, Ltd.	108—113	..	111½
60,000	5	15 My., '15	—	—	Ottoman	0—¼	..	..
205,162	Stk.	June 26	8	8	Plym'th & Stonehouse 5 p.c.	105 -108	..	..
424,416	,,	Feb. 20	8	8	Portsm'th Con. Stk. 4 p.c. Std	110—115	..	..
241,446	,,	,,	5	5	Do. 5 p.c. max. . .	78—81	..	..
186,000	100	June 2	4	4	Primitiva 4 p.c. Red. Deb. .	96—99	..	..
677,837	Stk.	July 24	4	4	Do. 4 p.c. Red. Deb. 1911	79—82*	..	..
371,496	,,	June 26	4	4	Do. 4 p.c. Cons. Deb. .	81—84	+1	81½
150,000	10	Apl. 3	6	6	San Paulo 6 p.c. Pref. . .	8½—9	..	..
1,736,968	Stk.	Mar. 20	6½	6½	Sheffield Cons.	103—105e	..	..
95,000	,,	July 10	4	4	Do. 4 p.c. Deb.	76—78e	..	..
90,000	10	June 5	†4	†5	South African	4—6	..	..
6,709.895	Stk.	Feb. 20	5	7½	South Met. Ord.	102—104	..	103½—104
500,000	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	109—112	+1	110—111
1,895,445	,,	July 10	3	3	Do. 3 p.c. Deb. . .	57—60	..	58½
734,000	,,	Mar. 6	6½	6½	Do. 6½ p.c. Red. Db.	99—101	..	..
91,500	,,	Mar. 20	8½	8½	South Shields Con. . . .	106½—107½	..	..
1,543,795	,,	July 24	6½	6½	South Suburban Ord. 5 p.c.	99—102*	..	100—101½
468,827	,,	June 26	5	5	Do. 5 p.c. Deb.	93—96	..	94½—95½
647,740	,,	Feb. 20	5	5	Southampton Ord. 5 p.c. max.	76—79	..	78½—79
121,275	,,	June 26	4	4	Do. 4 p.c. Deb.	71—74	..	..
179,014	,,	July 24	8	8	Sutton Ord.	110—118*	..	..
67,828	,,	June 26	5	5	Do. 5 p.c. Deb. . . .	93—96	..	..
250,000	,,	Mar. 6	7	7	Swansea 7 p.c. Red. Pref. .	98—101	..	..
200,000	,,	June 26	6½	6½	Do. 6½ p.c. Red. Deb..	98—101	..	..
1,076,490	,,	July 24	6⅝	6⅝	Tottenham District Ord. .	104 106*	..	104½
150,000	,,	,,	5½	5½	Do. 5½ p.c. Pref. . .	95—98*	..	..
199,005	,,	June 26	4	4	Do. 4 p.c. Deb. . .	73—76	..	..
182,380	10	30 Dec., '12	—	—	Tuscan, Ltd.	3½—4½	..	..
85,701	Stk.	Mar. 20	6	6	Do. 6 p.c. Red. Deb.	75—80	..	..
					Uxbridge, Maidenhead, &			
309,094	,,	Mar. 6	7	7	Wycombe 5 p.c.	94—99	..	..
88,330	,,	,,	5	5	Do. 5 p.c. pref. . .	85—90	..	..
					Wandsworth, Wimbledon,			
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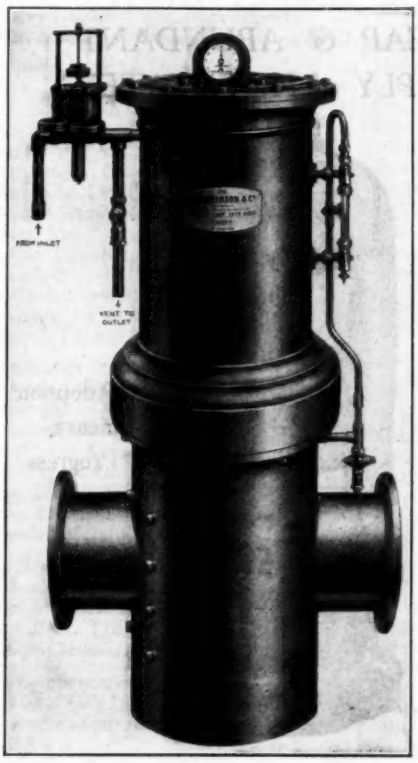

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